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Editorial Notes

OF all the modes of travelling a journey on a river-boat is perhaps the most pleasant, combining comfort with an ever-changing scene. These notes are being written on the ' Kirbekan ', an ancient steamer that plies on the Nile between Karima and Dongola—a distance of about 160 miles, between the 4th and 3rd cataracts. It is an almost rainless region with a winter and spring climate that would be perfect if it were not for the nimitti, a kind of biting midge that swarms in the Dongola reach at this time of year ; and even the nimitti are less tiresome on a boat. There are frequent halts to embark passengers and cargo (chiefly sacks of dried dates), and opportunities for short excursions. The speed of the ' Kirbekan ' is not great, and we have twice gained time for visiting ancient sites by disembarking and rejoining further on. The whole region is archaeologically almost unknown ; the sites of some of the principal antiquities are known, but many of them have been seen perhaps once only, and that not for more than a century. There are no plans of any of the sites, and the only descriptions are those of travellers whose visits were (like the present writer's) too brief to be adequate. The best general account is still that of Lepsius, who passed through the region nearly a century ago.

The remains belong to three periods : those of the Ethiopian kingdom (*circa* 750 B.C.–A.D. 350) whose capital was at Napata, now Merowé (not to be confused with the later Ethiopian capital Meroe much higher up the Nile near Shendi) ; those of the Christian Kingdom of Dongola (*circa* A.D. 550–1350) ; and those of the Fung period (*circa* 1504–1820). Between each was a Dark Age of some two centuries. The Napatan sites have been excavated by Dr Reisner, and publication is expected shortly. They are confined to the neighbourhood of Merowé and consist of pyramids and temples. The Christian sites are scattered throughout the whole region and consist of churches and forts. The Fung remains are of mud and stone castles.

We disembarked at Khandaq where on a rocky bluff above the river are the remains of a gaunt castle of rough stone whose ramparts are reinforced by buttresses and walls of unburnt mud brick. The ground is thickly strewn with painted and other potsherds

of the kind called ' Christian ', but not otherwise datable. In the lower parts of the tower are squared ashlar blocks of sandstone, probably reused from some earlier building. Round the castle is a small village. It was once an important place of call on the great caravan route from the south to Egypt, but like all the Dongola reach it is now by-passed and decaying. After examining the castle we took the bus that plies regularly between Omdurman and Dongola (300 miles, of which the first 200 are across the desert to Debba). Bus travel is always entertaining and the passengers were helpful in pointing out the sites of places named by travellers but not marked on the only existing map.

This map deserves a word of description. It is on a scale of 1 : 250,000 (roughly 4 miles to 1 inch), covers the whole Anglo-Egyptian Sudan, and is the largest scale map available. Field-work with a map on so small a scale would be very difficult even if the map were up-to-date and accurate, but it is not. It is particularly inaccurate in its representation of the numerous Nile islands, which are constantly disappearing or appearing elsewhere. Consequently it is often difficult to locate one's position on it. A country that has no adequate maps must be difficult to administer ; and one would have thought that a programme of air-survey might have had priority over some other forms of expenditure.

The outstanding site is Old Dongola, now a wretched village only. Here was once a large town, for 800 years the capital of a Christian Kingdom whose northern frontier was at the 3rd cataract. Old Dongola is 70 miles above the modern town which has appropriated its name and which dates only from the Turkish conquest of 1820. As one approaches from the south one sees a great bare berg hill on whose flat top sits a small and featureless but massive square building. This is an ancient church still intact and used as a mosque. Our boat did not stop there, and in order to see it we had to disembark at Amentigo, cross the river to Rumi, ride in a car (which by good luck happened to be available) to Sellenarti and recross the river. The ferry at Amentigo was one of those flat-bottomed boats described by Hornell (see ANTIQUITY, 1943, XVII, pp. 27–41). The sail is wound and unwound by a simple but effective device. The car ride is best forgotten. The driver was ' full ' and the radiator empty. We bumped and roared over a succession of cultivation-banks and entered a howling wilderness of sand and mirage. Fortunately we did not stick and it was only about 12 miles to the river again. We hailed a ferry-boat which put back and picked us up. From where we landed on the right bank it was about a mile and a half to Old Dongola. We had to walk quickly as we had only a couple of hours before rejoining the ' Kirbekan ' at Ghaddar. The air was brilliantly clear and the famous old hill with its church stood out well. As we neared it we passed through a maze of low mounds covered with broken red bricks characteristic of Christian sites all over the Sudan. Here was the town, and the ground was covered everywhere by thousands of potsherds, many of them of the typical painted kind that seem to date before the middle of the 14th century, but may be much earlier also. At the foot of the hill are the granite columns of a church, the capitals, with faintly discernible carved designs, lying near by. Here too are the wind-eroded remains of post-Christian houses, their sun-dried bricks full of Christian potsherds.

We climbed the hill and were conducted into the building. The church, still in use as a mosque, is on the first floor, and below it are some vaults that contain a well, but there seems also to be much space unaccounted for. In the church are five granite columns (the sixth replaced by a wooden substitute), supporting the flat roof that has taken the place of the original dome. The walls are covered with plaster ; but where parts of it have been removed on the west and north walls, the remains of rather weathered paintings can be seen—two heads on the west wall, but nothing definite elsewhere. The light is dim, and in a better light one might see more. Across the nave has been built a mud wall with a *mihrab* niche and on it is a dated inscription in Arabic stating that the building was converted to the use of Islam in A.D. 1317. (None of the books referring to this inscription give the actual text or a translation of it). There is a semicircular apse at the end of the church. The east wall is seen on the outside to be built of the typical baked red brick.

The whole site calls aloud for a detailed survey on modern lines, with plans and photographs (including air-photographs). It is one of the most important in the Upper Nile region, and the church one of the oldest in Africa still extant and more or less intact. If the plaster were removed it seems certain that a whole mass of paintings would be revealed, and good hope, from what is now visible, that they may have been left undamaged. The removal of the plaster, however, is obviously not to be undertaken without adequate safeguards for the future.

Our boat had the excellent habit of tying up at night, so that one did not miss much of the scenery. Two days later we passed Korti and entered the Shaigia reach where the Nile flows south-westwards for over a hundred miles. The Shaigia are Arabs, and the only people who made any attempt at resisting the Turks in 1820. The decisive battle (which they lost) was fought at Jebel Dega, now called Jebel Ibn Auf. From here onwards the right bank is fringed with palms, through which one can just discern the low sandstone cliffs, and catch a glimpse of the granite columns of a ruined church. We reached Maqāl and tied up at sunset, but there was just time to visit a fine fortress on the low hill there, immediately above the boat station. It is rectangular with 18 semicircular towers round the walls, which are 16 feet thick, or more in places, and consist of a thick wall of dry stone on each side, enclosing a core of red and burnt brick. Across the spur on the N.W. (or land) side are two deep trenches, the outer one at least 12 feet deep, resting on small khors on each side. The castle thus resembles a promontory fort. Its age is indicated by the red brick core and quantities of Christian pottery. Forts of similar construction have been recorded at Kubinat and El Kab above the 4th cataract. Nothing is known about their builders.

At Merowé, in the old village on the right bank, are the remains of four Shaigia mud and stone castles. These are much later and of an entirely different type. Essentially they are enlarged and strengthened versions of the courtyard house which is still today

normal in the Nile valley between Berber and Shendi. It consists of a rectangular mud wall incorporating several single-roomed buildings. In the castles these have more than one floor and take on the semblance of towers. But there is no symmetrical disposition of the towers, as in the earlier forts. The courtyard house is, in plan, simply a mud, or mud and stone, version of the primitive African zareeba dwelling or kraal, with the conical straw huts transformed into flat-roofed mud buildings, and the enclosing thorn zareeba replaced by a mud wall. Examples of the courtyard type of house are to be seen from the train window between Damer and Shendi as these words are being written. At the Turkish conquest in 1820 these Shaigia mud castles were still inhabited by the tribal chieftains, and full descriptions of them are given by the travellers who accompanied or followed behind the Turkish army—Cailliaud, Waddington, English and Hoskins. The largest at Merowé was taken over and used by the Turks, and the fact is still remembered locally and recounted on the spot. No plans of any of these castles have ever been made, and it is most desirable that this should be done before they have fallen into complete decay.

Our river-trek was one of the most enjoyable archaeological excursions that can be imagined. The scenery is varied and in places very beautiful. The early mornings, before the flies began to torment us and while it was still cool, were delightful. In this dry region the air has a clarity that gives an added beauty to the landscape—the bright yellow sand on the right bank with its brilliant green trees, the morning star casting its reflection on the calm water, and the purple hills beyond. The river is everywhere very wide, sometimes as much as half a mile, and the air therefore cool, even at midday. Even the minor discomforts are offset by the joy of making an occasional new discovery.

These rather disorderly notes cannot close without some expression of gratitude for the kindness and hospitability of the people we met during our travels. More than once we were pleasantly surprised to meet a reader of ANTIQUITY, even in the remotest place we visited ; and it was most gratifying to find so much real interest in the archaeology of the Sudan. On the return journey the writer was entrusted with two newly found Meroitic pots which were brought to the train to be conveyed to Khartoum Museum. Thus concluded a most successful tour.

A postscript written in the flying-boat over Sicily about 25 miles west or northwest of Catania. On a sloping mountainside still cultivated the unmistakable rectangular pattern of Roman centuriation is plainly visible. The upper limit is a broad belt running for several miles along the slope some distance below the top of the ridge and parallel with it. The ancient lay-out is recognizable by straight lines, broken in places, but plainly once continuous. The system resembles that near Split described by Mr John Bradford (ANTIQUITY, 1947, XXI, pp. 197–204), but it is rather less striking. This is the first time centuriation has been observed in Sicily.

The Classical Rhinoceros

by Sir William Gowers

BY the term ' classical rhinoceros ' I mean the rhinoceros which was known to the Greek and Roman world during the five and a half centuries between 300 B.C. and A.D. 250, which was shown from time to time at Alexandria under the Ptolemies and later on appeared regularly in the arena at Rome taking part in fights with other beasts and with men. Although the Indian rhinoceros seems occasionally to have been exhibited at Rome, at any rate in the early years of the Empire, I believe that the rhinoceros usually shown there came from Africa, and I have tried to analyse such evidence as is available to show firstly what species it was and secondly what part of Africa it came from.

There are, of course, two quite distinct kinds of African rhinoceros, the square-mouthed and the prehensile-lipped, popularly known respectively as the White and the Black Rhinoceros. Until recently their scientific names were *Rhinoceros simus* and *Rhinoceros bicornis*, but systematists have now separated them into two genera, calling the former *Ceratotherium simum* and the latter *Diceros bicornis* ; denying to both the title of *Rhinoceros* which they reserve for the Indian rhinoceros and its near Asiatic relatives. For the sake of simplicity and brevity I shall retain the old names and call them *simus* and *bicornis*.

The popular misnomers of ' white ' and ' black ' are a legacy from the South African Dutch of the 17th century, who called *simus* ' wit renaster ' and *bicornis* ' zwart renaster'. They were not very particular about exact shades of colour and probably meant no more than that one species usually appeared much lighter than the other. The natural colour of both appears much the same to an observer a little distance away. The hide of *simus* may be slightly lighter. Perhaps the most accurate definition is given by Roosevelt and Heller (1) who say that the true colour of *simus* is smoke-grey while that of *bicornis* is dark clove-brown.

The apparently light colour of *simus* which impressed ancient as well as modern observers is as a rule due to the habit, to which it is much more addicted than *bicornis*, of wallowing daily in muddy pools, the mud from which drying on its hide gives it often a much lighter colour than its natural one, the precise shade depending on the nature of the soil. Cornwallis Harris (2) who more than a century ago observed large numbers in South Africa—as many as eighty in one day's march—writes ' The outer coat acquired by constantly wallowing in pools often approaches cream colour '. *Bicornis* generally shows up in its natural dark colour but never looks really black like, for instance, the Cape Buffalo.

Simus is purely a grazing animal and its food consists of nothing but grass and such weeds as may accidentally be taken up with grass as cattle may do. *Bicornis* is a browser living almost entirely on the leaves and shoots of bushes, occasionally eating roots. *Simus* is much more dependent on water, both for drinking and wallowing, than is *bicornis* which can exist in arid and stony localities where *simus* could not survive. Finally,

[1] Theodore Roosevelt and E. Heller, *Game Animals of Africa* (1915), p. 670, see also Herbert Lang, ' The White Rhinoceros of the Belgian Congo ', *N.Y. Zool. Bulletin*, July 1920, p. 75.

[2] Capt. (later Sir W.) Cornwallis Harris, *Portraits of Game and Wild Animals* (1840), p. 98.

simus is much the larger animal, being indeed next to the elephant the largest land mammal, and probably weighs at least half as much again as *bicornis*.

Since the evidence I am concerned with is largely pictorial I will mention some characteristics of *simus* some of which are always shown (sometimes emphasized or exaggerated) in ancient representations of it. They are (1) the great size and length of the head in proportion to the body, (2) the low downward-pointing carriage of the head ; when travelling or standing at ease the muzzle nearly touches the ground, whereas the head of *bicornis* is held nearly horizontal, (3) a pronounced nuchal hump, just in front of the shoulders, (4) a great disparity in size between the front and rear horn—much greater than is usually found in *bicornis*, (5) a habit peculiar to *simus* when alarmed or excited of carrying its tail curled in a circle or ringlet (FIG. 7). *Bicornis* never does this ; its alarm signal is to raise the tail vertically as shown in FIG. 8. A curled-up tail is a certain indication that the animal depicted is *simus*.

The classical rhinoceros during the three centuries in which it appeared in Rome seems always to have been obtained through Egypt. The distribution of the rhinoceros in early times in the Nile basin therefore becomes relevant.

The earliest evidence about this is a rock drawing on a sandstone cliff to the west of the Nile at El-Hosh (Lat. 24–30 N) between Idfu and Assuan—discovered by H. A. Winkler (3), who states that it is the only rock drawing of a rhinoceros yet found in Egypt. It is shown in a procession of animals including elephant, antelope and gazelle. Winkler does not attempt to date it otherwise than by ascribing it to the ' autochthonous mountain-dwellers '. It looks rather like a caricature and not nearly so naturalistic as many of the earlier prehistoric rock carvings and drawings, e.g. that shown in FIG. 1 from much the same latitude in Libya (4). But it undoubtedly represents *simus*.

The next evidence chronologically is from the pottery models of rhinoceros horns found by Col. W. B. Emery (5) in the tomb of Hor-Aha at Saqqara—date about 3000 B.C. From the photographs they look very accurate models and their length and shape approximate to *simus* rather than *bicornis*. Moreover there is so far as I know no record of the existence at any time of *bicornis* in any locality whence the originals could have been obtained and brought to Lower Egypt at this date, whereas there is evidence of the existence of *simus* in Upper Egypt and Nubia both before and after the date of the Saqqara models.

The next item of evidence comes from Kerma about 30 miles north of Dongola (6), where there was an Egyptian trading outpost in Nubia and its date is between 1780 and 1680 B.C. It consists of an ivory or bone inlay and a raw-hide silhouette, both representing rhinoceros. The latter has its head damaged and the front horn broken off but I think it is certain, as already suggested by Hilzheimer, that both this and the inlay (FIG. 4) represent *simus*.

The latest evidence from ancient Egypt is provided by Mond and Myers, from Armant near Luxor (7). A frieze on a pylon of the temple here shows an animal said to be a rhinoceros ; it must have been drawn by an artist who had never seen one alive

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[3] H. A. Winkler, *Rock Drawings of Southern Upper Egypt* (1938), vol. I, p. 21 and pl. XX and XXI.

[4] Paolo Graziosi, *L'Arte Rupestre della Libya* (1941) vol. II, pl. 134a.

[5] W. B. Emery, *The Tomb of Hor-Aha* (Saqqara Excavations 1939), p. 72.

[6] G. A. Reisner, *Excavations at Kerma* (Harvard African Studies, 1923), vol. VI, pl. 53a. M. Hilzheimer, *Zeitschr. f. Aegyptische Sprache*, vol. 69 (1931), p. 72.

[7] Sir R. Mond and O. Myers, *The Temple of Armant* (1940), p. 25, pl. 8 and 103.

and in itself is of no value as an indication of species. But here was also found a stele of Tuthmosis III recording *inter alia* that in the course of an expedition into Nubia he killed a rhinoceros. The pictograph is like *simus*, and since the Kerma images provide evidence of the presence of *simus* in Nubia two or three centuries earlier we may reasonably assume that Tuthmosis' rhinoceros was also *simus* and that it existed there in the middle of the second millennium B.C.

I know of no more evidence from ancient Egypt. In the Sudan, however, a rock-drawing of a rhinoceros, which must be *simus* has been recorded from Northern Darfur by A. J. Arkell, *Sudan Notes and Records*, vol. XX, p. 281. To come down to much more recent times we have the story in Pseudo-Callisthenes (8) of the eighty rhinoceros offered to Alexander the Great in 331 B.C. by a much antedated Candace queen of Meroe, as to which we may say that the legend would probably not have originated unless rhinoceros had been common in the Meroitic kingdom at that date.

There can I think be no doubt of this. We have the record of Ptolemy II's 'Ethiopian' rhinoceros (*infra*), and some 350 years later Pliny (N.H. VI, 35) referring to the exploring expedition sent by Nero to the Sudan in A.D. 65 says that they reported that when they reached the neighbourhood of Meroe (about Lat. 17 N.) *herbas demum viridiores sylvarumque aliquid apparuisse, et rhinocerotum elephantorumque vestigia.*

Assuming that these rhinoceros were of the same species as those recorded from Nubia by the ancient Egyptians—and there is no reason to doubt it—we seem to have a picture in the Nile basin of a gradual retreat by *simus* due to increasing aridity from a northern front of at least 25 N in the 4th millennium B.C. to about 19 N in the second millennium and 17 by the beginning of the Christian era (9). About this point in the Nile valley it was probably stabilized for a considerable time having reached a region where rainfall was sufficient for the grass it needed. The most northerly point at which *simus* has been recorded recently (1927) is Goz-Beida in Wadai in Lat. 12 N about 70 miles from the western frontier of Darfur (10).

An unfordable river is a complete barrier to the movement of rhinoceros and I feel doubtful whether the distribution of *simus* in Egypt and the Sudan ever extended to the east of the Nile. That it existed in Eastern Africa South of the Equator in prehistoric times is shown by the rock drawings from Kisese in Tanganyika figured by Leakey (FIG. 2) (11), but whether it existed throughout East Africa at this time and if so what caused its complete disappearance from territories where *bicornis* continues to flourish is a mystery as yet unsolved.

What we do know is that the migration of *simus* in modern times in an east south easterly direction from Lake Chad, Kanem, Bagirmi, Wadai and the Ubangi-Shari has been held up at the Nile on a front of some 400 miles north of Lake Albert. It seems to me possible that it only reached the Nile in these latitudes some 50 or 60 years ago. Otherwise its existence must surely have been detected by such observers as Baker, Junker Schweinfurth and Emin, who spent years in or close to the region where it is now

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[8] Pseudo-Callisthenes, *Hist. Alex Magni* III, 18 (ed. W. Kroll, Berlin, 1926).

[9] S. A. Huzzayin, *The Place of Egypt in Prehistory* (1941), p. 285, thinks there was in Saharan latitudes, in the 1st millennium B.C. until early A.D. a phase of increased rainfall which may be equated with Leakey's Nakuran wet phase. This, if so, would slow up the southerly retreat of *simus*.

[10] L. Lavauden, *Faune des Colonies Françaises* (1933–4), p. 420. Lavauden also records that in 1927 there were stored in Khartum, in transit from Wadai, no less than 150 *simus* horns. Major W. R. Barker, lately Game Warden in the Sudan, corroborates.

[11] L. S. B. Leakey, *Stone Age Africa* (1936), ch. VIII, fig. 27.

most common. The real discoverer or re-discoverer of the northern geographical—no doubt the original— race of *simus* was von Heuglin (12), but he met with it 200 miles or more West of the Nile.

The first African rhinoceros to be mentioned by classical writers was the one which was exhibited at Alexandria in the great procession in 284 B.C. at the festival of Dionysus which coincided with the accession of Ptolemy Philadelphus. It is mentioned by Athenaeus (v. 201(c)) on the authority of Callixeinus. It is described as 'Αιθιοπικός, a term which often has a very vague geographical connotation but which at that date in Egypt must have meant that it came from Nilotic Ethiopia, i.e. the kingdom of Meroe, with the ruler of which Ptolemy was on good terms and from whom he may well have obtained it.

The only picture of a rhinoceros in Ptolemaic times is in a frieze in one of the rock tombs at Merissa (13) in Southern Palestine—the old Idumaea. It was drawn about 200 B.C., when Palestine was under Egyptian rule. The animal, labelled ' rhinoceros ', is among other animals associated with Egypt, which are well executed—next to it is an African elephant. But the so-called rhinoceros is evidently done from a description only and the only inference to be drawn from it is that it had been described to the artist as being like a gigantic pig, with a horn at the end of its nose and an extremely minute horn behind this.

The earliest description of an African rhinoceros that we have is from the geographer Agatharchides who wrote about 130 B.C. (14). He lived for a long time at Alexandria and, as he says, had access to the reports and memoranda, in the royal archives, of the early explorers of the Red Sea coasts and of the officers who were stationed there. The description comes in his account of the fauna of the ' Trogodyte ' country, i.e. the modern Eritrea and northern Somaliland. He says that the length of the rhinoceros is about the same as that of an elephant but its height is less. This would be true of *simus*, which may be as much as 13 feet long—about the same as the species of elephant known to Egypt at that time. Its colour, he says, is like boxwood ; here he agrees with the Dutch who called it white and with Harris's ' cream colour ' (*supra*). It has a bent-back (σιμόν) horn on the end of its nose as tough as iron. No mention is made of a second horn and this points to *simus* rather than *bicornis*. The rear horn of *simus* is often negligible, consisting of a mere knob so that an observer might well describe it as one-horned. Harris writes that while the front horn is a formidable weapon 3½ feet long ' the other horn is generally such a mere excrescence that at a distance of even a few yards it is barely perceptible ' (15). In the middle of the 19th century the Arab traders who brought *simus*

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[12] Th. von Heuglin, *Reise in das Gebiet des Weissen Nil* (1869), p. 361. *Simus* could not have travelled due south from E. Kordofan ; the Bahr-al-Ghazal would have prevented it.

In 1825 a pair of *simus* horns had been brought to England by Major Denham from the vicinity of Chad, but they were not then recognised as *simus*, which was believed to exist only in South Africa, where it had been ' discovered ' and named by Burchell some 10 years earlier.

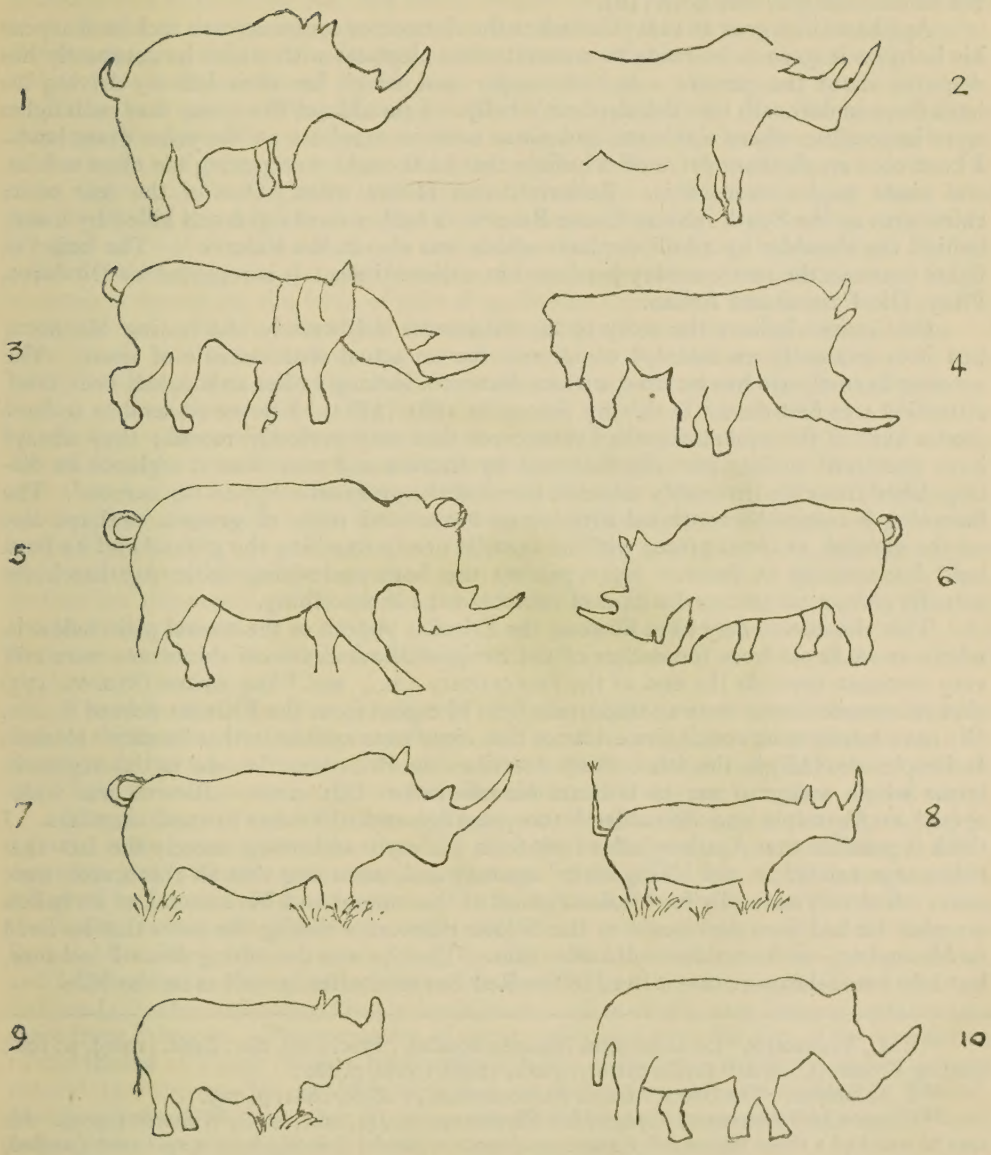
[13] J. P. Peters and H. Thiersch, *The Painted Tombs of Merissa* (1903), (Palestine Exploration Fund).

[14] Agatharchides, *De Mari Erythraeo* (P. 71), in C. F. Mueller's *Geographi Graeci Minores* (1856), vol. I.

[15] Op. cit., p. 98. Modern records show that the front horn of *simus* is on the average nearly four times as long as the rear horn while in *bicornis* it is a little less than twice as long. I am inclined to think that since *simus* has been confined to semi-forest country it does not develop such long front horns as it did when it lived on the open plains.

THE CLASSICAL RHINOCEROS

PROFILES OF RHINOCEROS (not to scale)



1. LIBYA — PREHISTORIC
2. TANGANYIKA — do.
3. UPPER EGYPT — do.
4. NUBIA — 1730 B.C.
5. ALEXANDRIA — A.D. 91 (Coin of Domitian : × 3)
6. ROME — A.D. 95 (Coin of Domitian : × 3)
7. R. SIMUS
8. R. BICORNIS
9. R. UNICORNIS

From recent photographs from life

10. ROMAN TESSERA, 1st century A.D. (Rostovtsev No. 486) (× 3)

horns from Kanem and Wadai for sale in Tripoli and Jeddah were firmly persuaded that the animal had only one horn (16).

Agatharchides goes on to say that when the rhinoceros comes across a rock he sharpens his horn on it so as to be ready to encounter the elephant with which he constantly has disputes about the pasture – περὶ τῆς νομῆς – and which he often kills by driving his horn from underneath into the elephant's belly. I should not like to say that such fights were impossible where elephants and *simus* were in numbers on the same grass lands. I have seen an elephant drive off a buffalo that he thought was grazing too close to him, and *simus* might resent this. Roosevelt and Heller write 'One of the few white rhinoceros in the South African Game Reserve, a bull, was charged and killed by a stab behind the shoulder by a bull elephant which was also in the Reserve'. The belief in fights between the two was very persistent in ancient times; it is repeated by Diodorus, Pliny, Dio Cassius and Aelian.

One cannot believe the story of the rhinoceros deliberately sharpening his horn, but it is evidently an attempt to account for an actual characteristic of *simus*. The anterior horn always has its front surface flattened, looking rather as if it had been filed. Attention was first drawn to this by Selous in 1881 (17): 'I never remember to have seen a horn of the square-mouthed rhinoceros that was perfectly round; they always have the front surface partially flattened by friction and may thus at a glance be distinguished from the invariably rounded horns of the prehensile-lipped rhinoceros'. The flattening is caused by continual abrasion on the matted roots of grasses, perhaps also on the ground, as *simus* grazes with its nostrils nearly touching the ground and its horn held horizontally in front. By repeating the horn-sharpening fable Agatharchides actually gives a pointer to the kind of rhinoceros he is describing.

This rhinoceros may have lived on the Eritrean plateau or the coastal plain below it, where as we know from the author of the *Periplus Maris Erythraei* rhinoceros were still very common towards the end of the first century A.D.; and Pliny writes (N.H. VI. 173) that rhinoceros horns were an important item of export from the Eritrean port of Adulis. We have however no conclusive evidence that *simus* ever existed in that locality. Cosmas Indicopleustes (18) in the 6th century describes the rhinoceros he saw in this region in terms which seems to me to indicate *bicornis* rather than *simus*. *Bicornis* was widespread in Abyssinia and Somaliland 100 years ago and still exists in small numbers. I think it possible that Agatharchides took from his early authorities merely the fact that rhinoceros existed in the 'Trogodyte' country and, assuming that all rhinoceros were alike, relied very naturally for his description of the animal and his account of its habits on what he had seen and heard of the Nilotic rhinoceros during the years that he lived in Alexandria—as Artemidorus did after him. That he was describing *simus* I feel sure, but I do not feel so sure that it lived in the Red Sea territories as well as on the Nile.

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[16] E. L. Trouessart, 'Le Rhinoceros blanc du Soudan', *Proc. Zool. Soc. Lond.* (1909), p. 198; quoting Fresnel (*C. R. del'Ac. des Sciences Paris*, 1848), t XXVI, p. 281.

[17] F. C. Selous, 'The South African Rhinoceroses', *P.Z.S.*, 1881, p. 725.

[18] Cosmas Indicopleustes, *Topographia Christiana*, XI, 441, edit. E. O. Winstedt (1909). He says he watched a rhino from a safe distance and made a careful drawing from a specimen (stuffed) in the King's palace at Axum. This must have been lost as the picture in the 13th century 'Laurentian' MS cannot have been drawn by Cosmas or anyone who had seen a rhino. His description gives it two horns and a hide rather like an elephant. It is φοβερώτατον πάνυ μάλιστα. (Africans generally are terrified of *bicornis* but not afraid of *simus*.) It is possible that both species co-existed in Eritrea in Ptolemaic times and that by Cosmas' day *simus* had been exterminated there.

The next description is by Artemidorus, who wrote some 30 years after Agatharchides, in a work on the Red Sea which Strabo (XVI, 4, 15) quotes in giving an account of the fauna of the Somali coast between the straits of Bab el Mandeb and Guardafui. His description closely followed that of Agatharchides (whom Artemidorus generally follows) and to have been confirmed by his own observation of a rhinoceros, no doubt *simus*, which he had seen at Alexandria, probably in the royal Zoo. But Strabo, writing a century after Artemidorus disagrees with the description. He disagrees as to the length of the body and as to the colour, which he says is not like boxwood but more like that of an elephant. Its height he says is that of a bull and in shape it is most like a wild boar expecially about the head except for the horn on its nose ' tougher than any bone'. He goes on: ἔχει δὲ τύλους δύο ὡς οἷν σπείρας δρακόντων—it has two raised ridges like the coils of snakes, from the spine to the belly, one at the shoulders one at the loins. Strabo is certainly describing the folds of skin of an Indian rhinoceros which he had probably seen at Rome ; if he had seen it at Alexandria, where Artemidorus saw his, I think he would have said so; and there is no reason to think that Indian rhinoceros were ever brought to Alexandria. To him and his contemporaries a rhinoceros was just a rhinoceros ; he had no idea that a rhinoceros from India was a quite different animal. He had to believe the evidence of his own eyes and not unnaturally concluded that his usual authority Artemidorus had made for once an unaccountable mistake. Suetonius (Div. Aug. 43, 4) says that Augustus, apart from the regular *spectacula*, used to exhibit specially any noteworthy rarity which might have been brought to Rome, and showed thus a rhinoceros in the Campus Martius and a tiger on the stage. Pliny (N.H. VIII, XXIV, 65) tells us that in 11 B.C. Augustus exhibited a tame tiger—the first tiger ever seen at Rome; and it may be that the rhinoceros which Strabo saw was the one mentioned by Suetonius as being shown at the same time as a tiger. Both were probably gifts from Indian rulers who from time to time sent embassies to Rome with offerings which on one occasion included elephants (Florus II, 34).

A marble relief from Pompeii figured by Keller (19) shows a rather conventionalized Indian rhinoceros dressed in some fabric cut so as to resemble a coat of armour ; the design may have been based on this or another rhinoceros similarly exhibited. I know of nothing to indicate that at Rome an Indian rhinoceros was anything but a great rarity.

The rhinoceros was first seen at Rome according to Pliny (N.H. VIII, XXIX, 71) in 55 B.C., at the great *spectacula* staged by Pompey in the year of his consulship. Pliny describes it as *unius in nare cornus, qualis saepe visus*. This has led Warmington (20), followed by Jennison (21), to suppose that from this date to the time of Vespasian it was the Indian rhinoceros (*Rhinoceros unicornis*) which was regularly seen in the arena at Rome. But Pliny was merely copying Agatharchides, as the rest of the passage shows, and I cannot believe that Agatharchides was describing, in 130 B.C., an Indian rhinoceros. Solinus (43) while following Pliny's description implies clearly that Pompey's rhinoceros came from Ethiopia. The spectacles of 55 B.C. coincided with the date of the restoration to the throne of Egypt (largely by Pompey's help) of Ptolemy Auletes ; and it is quite natural to suppose that Ptolemy supplied an Ethiopian rhinoceros for the festival. Jennison indeed suggests that Ptolemy supplied the rhinoceros but that it had been imported to Egypt from India, which seems to me highly improbable.

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[19] Otto Keller, *Die Antike Tierwelt* (1909), p. 387.

[20] E. H. Warmington, *Commerce Between the Roman Empire and India* (1928), p. 151 and note p. 360.

[21] G. Jennison, *Animals for Show and Pleasure in Ancient Rome* (1937), p. 34.

There is a life-like representation of a White Rhinoceros in a black and white mosaic in Perugia (figured in *Notizie degli Scave* (1877) pl. XI) attributed to the time of Augustus. The rhinoceros appears among other animals being charmed by Orpheus; they include elephant, aurochs, stag, lion, leopard and bear. All of these could no doubt be seen at that time either in the arena or in the *vivaria* on the outskirts of Rome; they give the impression of having been drawn from life. The rhinoceros is shown as practically one-horned, with an indication of a rudimentary second horn just behind the first. If Pliny had seen such an animal he would certainly have described it as *unius cornus*.

Figures of rhinoceros appear on some of the leaden *tesserae* (22)—tokens or counters—which under the Roman Empire were issued to the public for the purpose of giving admission to the *spectacula*. Some of these show only one horn, and Warmington (op. cit.) regards them as representing Indian rhinoceros. But the Indian rhinoceros has a comparatively small head, held rather high (FIG. 9); very different from the massive down-pointing head shown on the *tesserae* (FIG. 10). This I regard as a more reliable indication of species as between the Indian *unicornis* and the African *simus* than the presence or absence of a second horn in these rather primitive designs. On all the *tesserae* I have seen I believe the rhinoceros figured is *simus*. One, in the British Museum, has a rhinoceros on one side and a crocodile on the other, suggesting a Nilotic origin for both.

A rhinoceros is shown in a section of the mosaic now in the Palazzo Barberini at Palestrina (Praeneste) (23) which purports to depict the scenery of the Egyptian Sudan including the Nile and its fauna. There are two small horns, very close together, and a pronounced hump behind the head. The mosaic probably dates from the 2nd century.

The next rhinoceros, after Pompey's, mentioned by the ancient writers was seen in 29 B.C. at the shows put on by Octavian to celebrate the defeat of Antony and Cleopatra and the annexation of Egypt. Dio Cassius (LI, 22, 5) records that among the beasts slaughtered were a rhinoceros and a hippopotamus, both seen then for the first time at Rome. (*πρῶτον τότε ἐν τῇ Ῥώμῃ ὀφθέντα*). In saying this Dio ignores Pompey's earlier rhinoceros, and also the hippopotamus shown by Scaurus in 58 B.C. The occasion of the spectacles and the juxtaposition of rhinoceros and hippopotamus strongly suggest that the former came from Egypt, as the latter must have done.

Dio records that towards the end of the reign of Augustus, in A.D. 8, an elephant defeated a rhinoceros in a fight in the arena, but nothing is said as to its origin.

After this there is a long gap in the literary records about the rhinoceros but we need not infer that it did not continue to be exhibited regularly. Pliny's *saepe visus* and its images on the *tesserae* suggest that it was.

The next literary allusions come from Martial's *De Spectaculis*—a book of epigrams written to commemorate the opening of the Colosseum by the Emperor Titus in A.D. 80 Epigram 22 is well known—

> Sollicitant pavidi dum rhinocerota magistri
> seque diu magnae colligit ira ferae
> desperabantur promissi praelia Martis
> sed tandem rediit cognitus ante furor.
> Namque gravem cornu gemino sic extulit ursum
> iactat ut impositas taurus ad astra pilas . . .

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[22] M. I. Rostovtsev, *Sylloge Tesserarum Plumbearum* (St. Petersburg, 1903). A good example of a rhinoceros with one horn which is clearly *simus* is no. 486, tab. IV, 7.

[23] G. E. Rizzo, *Pittura Ellenistica Romana* (1929), pl. 188, 189.

and Martial goes on to tell how the rhinoceros defeated a *bubalus* (probably an aurochs) and a bison, while a lion fled headlong from it.

The difficulty of the keepers in rousing it to the requisite pitch of irritation suggests the placid *simus* rather than the testy *bicornis* ; but one has no need to speculate about its species since conclusive evidence is supplied by two bronze coins of Domitian, whose reign began the year after the *De Spectaculis* was published. Suetonius says of Domitian '*spectacula assidue magnifica et sumptuosa edidit*' and he may have taken a special interest in rhinoceros.

The earlier of these coins (24) was struck in Alexandria, for circulation in Egypt, in A.D. 91, the second in Rome four years later. (25) A rhinoceros occupies the whole of the reverse of each. Outlines of the animals taken from enlarged photographs are shown here as FIGS. 5 and 6. No one familiar with the African rhinoceros can I think feel any doubt as to the species they represent. The nuchal hump is not well shown but the curled tail, the square mouth and the size and carriage of the head are characteristic of *simus*.

A coin of Hadrian (26) (mint of Alexandria) of A.D. 127 also shows *simus* but the design is somewhat defaced and not so clear as in the coins of Domitian, though the large size of the head is even better indicated.

Antoninus Pius (*Hist. Augusta*, A.P. X) is said to have shown on one occasion (perhaps A.D. 149) elephants, hyenas and tigers—which probably came from Asia—and rhinoceros, crocodiles and hippopotami (from Africa). The historians and biographers make no allusion to it during the reign of Marcus Aurelius (as one might expect) but Commodus is said by Dio to have killed more than one rhinoceros in the arena and Caracalla also killed one. The *Historia Augusta* (El. XXVIII, 8) speaking of the collection of animals which Elagabalus (A.D. 220) kept at Rome says *habuit et hippopotamos et crocodilum et rhinocerotem et omnia Aegyptia quae per naturam sui exhiberi poterant*, which indicates that the rhinoceros was still considered an essentially Egyptian product.

Pausanias (*c.* A.D. 170) writes—more accurately than his contemporaries—that he saw at Rome 'Ethiopian bulls' called rhinoceros because they have a horn on the end of the nose and another smaller one behind it. Aelian (*c.* A.D. 215) in his *Historia Animalium* writes that it would be merely tedious for him to describe its appearance since so many Greeks and Romans had seen it—and then proceeds to repeat Agatharchides almost word for word (27).

The latest mention of the classical rhinoceros at Rome is in the *Historia Augusta* (Gordiani Tres. 33). Among the animals collected for Gordian's Persian triumph, and eventually shown by Philip the Arabian in A.D. 248, were six hippopotami and one rhinoceros. That this should be the last mention of the rhinoceros at Rome is just what we should expect if, as I believe, it was always obtained from Ethiopia. For in A.D. 250 occurred the revolt of the Blemmyes and their attacks on Egypt, which inaugurated a period in which Rome lost for ever all control and influence in Nubia and the Meroitic kingdom, which itself was conquered by the Axumite Abyssinians a century later.

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[24] B. M. C. *Domitian* no. 333. An interesting feature of this coin is the sphere or disk on top of the head between the ears.

[25] B.M.C. Cat. *Roman Empire*, vol. II, p. 411 and pl. 31, 17.

[26] B.M.C. *Hadrian*, no. 835.

[27] Agatharchides' original description of the African rhinoceros, copied by Pliny, who very likely had never seen one, became the standard description and was used by e.g. Dio Cassius and Aelian long after the second horn had been shown on coins.

After A.D. 250 it would, I think, have been impossible for the Romans to obtain any more rhinoceros from the Sudan.

There does not seem to have been any other source from which the Romans could have regularly obtained rhinoceros during the three centuries during which they were shown at Rome. In prehistoric ages *simus* was widespread throughout North Africa and the Sahara and it is just possible that it may have lingered in Roman Africa even into historical times in a few climatically favoured spots. But no writer refers to its existence there and even the Saharan rhinoceros is, I think, only once referred to—in the well known passage of Ptolemy (1, 8) quoting Marinus of Tyre's description of an expedition by Julius Maternus at the end of the 1st century A.D. which started from

RHINOCEROS ON ROMAN MOSAIC, PERUGIA

Leptis Magna and passed through the country of the Garamantes (Fezzan) with the object of subduing some rebellious ' Aethiopians ' in the South. At its furthest south the expedition reached the region of Agisymba ' where the rhinoceros congregate '. It seems most likely that Agisymba was the Tibesti plateau (about Lat. 20 N) (28). The wording does not suggest that there was anything remarkable in seeing rhinoceros on the journey, only in seeing so many in one locality. The explanation no doubt is that as the desiccation of the Sahara and the Libyan desert progressed the higher plateaux such as Tibesti were the only localities which still had enough rainfall to provide water and grazing for *simus*—at any rate in any numbers.

The province of Roman Africa being excluded as a source of supply, the only remaining alternative to the Sudan is the coastal belt of the Red Sea—Eritrea and Somaliland. This would have involved shipping the rhinoceros to Myos Hormos (Kosseir) or Berenice, with an overland journey to the Nile (29). The Ptolemies did this in the 3rd century B.C. with elephants, which were all-important to them, but it seems very unlikely that either they or the Romans ever did it with rhinoceros. There was no need to ; transport down the Nile from the Meroitic kingdom would be simpler and easier. Moreover during the period in which *simus* was regularly brought to Rome it is not certain that it existed in the Red Sea territories ; and nothing to indicate that African rhinoceros were ever brought to Rome otherwise than by way of Egypt.

There is no evidence either literary or pictorial that *bicornis* was ever brought to Egypt or Rome. It seems probable that the geographical distribution of *bicornis* has

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[28] F. R. Rodd (now Lord Rennell), *People of the Veil*, p. 318. Seventeen centuries after Maternus' expedition *simus* was still common some four or five hundred miles south of Tibesti.

[29] The Gulf of Suez and the canal to the Nile seem not to have been used, at any rate by north-bound craft.

not altered appreciably in the last 2000 years except in peripheral areas owing to its destruction by man since the general use of firearms (30), and that it existed in the Sudan in the days of the Roman Empire in much the same area that it inhabited 100 years ago; that is to say East of a line running roughly S. by W. from Tokar through Kassala—too far from the White Nile for convenient transport to Egypt. Moreover it is more aggressive and dangerous, more elusive when persecuted, and I think more difficult to handle unless caught when very young, than is *simus*. It seems unlikely that the Romans would wish to import *bicornis* if they could get the larger and more impressive *simus* with less trouble.

I think that after considering all the items of evidence set out above we are justified in believing that the classical rhinoceros was the White Rhinoceros as we know it today, and that it came from the Nilotic Sudan, probably from the West bank of the White Nile where (though much further South than in Roman times) it still survives in larger numbers than elsewhere (31).

[30] The persistence of *bicornis* is illustrated by the fact that when it was found necessary recently to eliminate it from an area of some 600 square miles of dense bush, which was required for native settlement not much more than 100 miles from the capital of Kenya Colony, not less than 1000 rhinoceros had to be killed.

[31] There may be at most 2000 *simus* still alive in Africa, of which about half are believed to be in the Bahr-al-Ghazal province of the Anglo-Egyptian Sudan.

Moas and Man

(PART II)

THE WAIRAU MOA-HUNTER SITE

by Roger Duff

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BY reviewing the bearing on Maori culture history of the excavation of Moa-hunter sites in New Zealand the previous chapter serves as an introduction to this account of the Wairau site, which is the most important Moa-hunter site yet recorded.

So haphazard is the progress of archaeology in New Zealand that although this camp occupies more than 15 acres and is situated on an accessible beach about seven miles from the town of Blenheim, it was not discovered until 1939. It was first ploughed about 1922, when the tenant, Mr C. Eyles, was surprised at the number of bones uncovered. Being unfamiliar with moa bones, he believed the larger bones were those of the bullocks formerly employed to cart wool along the boulder bank, and the smaller to be human. Presumably miscellaneous artifacts were also revealed by the plough but only a number of stone adzes were recognized and retrieved. Of these the only one saved is a massive example of Type 1, A one of the most distinctive Moa-hunter types.

The site was not identified as of Moa-hunter age until some seventeen years later, when Jim Eyles, the thirteen-year old grandson of the former tenant, decided to emulate the spasmodic activities of local collectors who occasionally visited the site in search of 'Maori curios'. He opened up a trench on the edge of a convenient mound and immediately found the first of seven burials each, as subsequently established, with a moa egg grave offering.

The recovery of the perfect egg apparently overshadowed the fact that it had been blown from one end and was attached to a human skeleton. Long-standing beliefs, based on Maori tradition, that certain tubular beads of stone, normally found singly, had been used by their ancestors either as the fly-wheel of the pump-drill or as genealogical mnemonics, were however corrected by the recovery in the grave of seven essentially similar beads in whale-ivory assembled as a necklace and relieved by a sperm tooth as central pendant (Andersen, 1940). At best the find was regarded as a lucky accident with no reason to expect a repetition, no follow-up visit to the site was made, and it was left for Eyles in March 1942 to dig a little further into the same mound and uncover a second burial provided with the wealth of offerings shown in the plate. In addition to the egg, of which only crushed fragments remained, there were fourteen stone adzes, the largest 18 inches in length and weighing over 10 lbs., a necklace of eleven large moa-bone beads, a second comprising 18 moa-bone units worked to the shape of conventionalized whale-teeth, a third comprising 21 similar units, here cut from sperm whale-teeth, and approximately eight hundred drilled porpoise teeth.

A reconstruction of this burial as displayed in the museum is shown in PLATE 1. It is essentially a conjectural restoration, based on no better first-hand details than Jim could remember a month later, with the depth and section based on my own observations on the third burial. Canterbury Museum did not intervene until after the discovery of this second burial and my field notes commence from Burial 3.

Significance of Site

Before proceeding to refer to subsequent burials and to review the burial and midden recoveries, I propose to describe the situation of the Wairau camp.

In its location at a river-mouth and more particularly its placing at the extremity of the spit or boulder bank formed between the river estuary and the sea, the Wairau site agrees generally with the South Island east coast sites. Those recorded occupy on the average the mouth of every third or fourth river from the Wairau to the Clutha. For the selection of estuarine settlements there are obvious reasons. To settlers dependent on fishing and fowling*, landed by choice or accident on a predominantly treeless and barren coast, estuaries provide the greatest concentration of food. Assuming that the surviving moas favoured an estuarine habitat, this was an added incentive, and many Moa-hunter

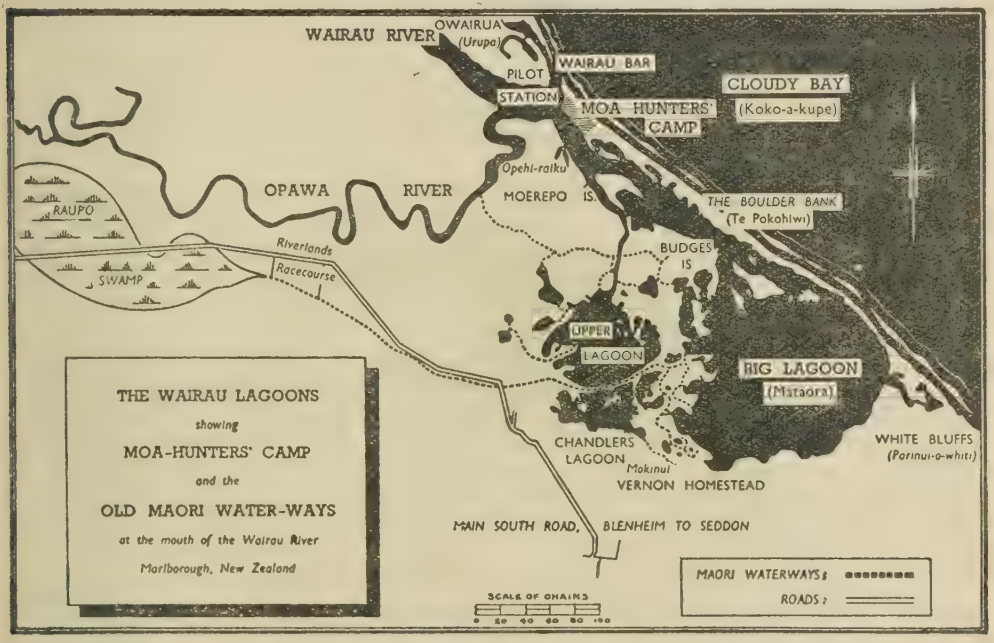


Fig. 1. LINE MAP, SHOWING SETTING OF WAIRAU CAMP

sites similarly occupy the dead end of a spit into which moas could be driven and readily trapped. (This placing would also accord with the alternative theory that the moas were rounded up far inland and brought down by water to these river-mouth sites, or even transported by sea from adjacent coastal localities. Inland Moa-hunter sites are however small, suggesting only transient occupation, and remarkably few ; up to now they have been recorded only in the Waitaki Gorge and the Maniototo Plain).

Certainly the Wairau camp is well sited for a moa drive, occupying the dead end of a long and narrow shingle spit, roughly 5 miles long and averaging 10 chains in width

* Tradition is emphatic that food plants were not introduced until the Fleet migration (1350).

(FIG. 1). The spit furthermore originates in a narrow strip of sea beach closed off immediately to the south by the sea cliffs of the Vernon Hills which in turn follow the inner shoreline of the vast Wairau lagoons. Whether the moas were chased down from the Vernon Hills or cautiously edged round the inner lagoon shores it should not have been difficult for the Moa-hunters, and their dogs, to turn them up the boulder bank. Escape was then impossible and the birds were driven to the cul-de-sac of the river mouth and there despatched.

Here an area of 15 to 20 acres through which the plough or the spade uncovers midden moa-bones represents the end of the chase. Whatever hunting theory we accept, the concentration of bones represents in my view an abnormal accumulation. Were it a normal sampling of the moa population, their extermination, even by Cook's time, would seem incredible.

The outline map (FIG. 1) shows the position of the main camp (hatched) occupying the inner lagoon shore of the boulder bank extremity where the Wairau and its Opawa tributary enter the Pacific at Cloudy Bay. The broken lines indicate the course of canals, totalling 12 miles in length, dug out to provide channels through which migrating eels might be trapped. According to the Rangitane Maoris of 1912 these were only constructed in the 18th century, and we need assume no relation between these and the Moa-hunter occupation of the Boulder Bank.

It is important, in view of the persistence of Maori tradition that the pre-Fleet tribes had not introduced the sweet potato (*Ipomoea batatas*) the taro (*Colocasia antiquorum*), the yam (*Dioscorea sp*) and the gourd (*Lagenaria sp*), that the site appears unsuitable for cultivation. As the name implies the boulder bank is a narrow bar made up of millions of tons of beach stones and shingle thrown up by the sea. Even at the broader river-mouth end, where its width is 15 chains, it remains essentially a gravel and boulder deposit, deficient in soil. The same limitations to cultivation apply even more obviously to the remaining South Island sites, while south of the Opihi the climate would prohibit the growth of the sweet potato even if the soil were sufficient. Post-Fleet tribes succeeded, by taking great pains, in growing the sweet potato as far south as the Opihi river and to do so settlement was moved inland to richer and deeper soil. As this zone takes in the Wairau, Grassmere, Hurunui, Sumner and Rakaia camps one might expect, if the Moa-hunters practised agriculture, some trace of a Moa-hunter site on cultivable land.

It is noteworthy also that the Wairau site was not fortified, nor by 18th century Maori standards would such a site be capable of conversion into a strong point. Here again the other Moa-hunter sites agree. Taken in conjunction with the absence of the terraced fort (pa) in the Chatham Islands, this is presumptive evidence that the pa was developed in the North Island, possibly in the post-Fleet era.

The weight of (again) negative evidence is indeed against the assumption that the Moa-hunter tribes practised warfare or cannibalism. No human bones were found in the Wairau middens; nor any utilitarian implements (such as fish-hooks, needles, awls, etc.) in human bone. One necklace at Wairau comprises reel-shaped beads of what appears to be human bone; assuming the correctness of the identification, the conversion to amulets or ornaments implies that the bones were more probably those of relatives than of enemies. The absence of weapons is not conclusive, as the hand club (patu) of durable stone or bone may not then have been developed, and weapons might have been of wood which would not survive in open beach sites.

Notes on Excavations. With traces of human occupation thinly rather than evenly scattered over an area 27 chains long and averaging 5 chains in width, systematic excavation has not yet been attempted. The most important exception was the burial area first discovered, where after the recovery over a three-year interval of Burials 1 and 2, the excavation was systematically continued as far as the area could be traced, and resulted in the recovery of a further five burials. Singly or in groups 24 further burials were found at widely scattered points, but in every case following ploughing. In addition to the range and wealth of grave offerings thus recovered, a considerable number of artifacts have been picked up on the surface after cultivation.

Although the oldest recorded, the site is thus typical of New Zealand in the shallowness of the deposit and in the absence of stratification. The burials from the cultivated area were in many cases struck by the share of a plough set at 9 inches. Assuming that breaking the surface of the light stony soil of the Boulder Bank had enabled wind erosion to lower the original surface, the greatest depth of any burial in an unploughed area (Burial 3) was only 28 inches. The Moa-hunter association of the burial finds is reasonably established from the evidence in nine cases of moa egg offerings, in some from the presence of moa bones in the grave and in others from the intrinsic evidence of the objects themselves. Similarly from the universal presence of moa bones in the middens the association of artifacts recovered by digging was not difficult to establish in practice. With surface finds after ploughing however the association can not be assumed, as such a site would be periodically visited and temporarily occupied until the early 19th century. So far however the nature of the surface finds warrants the assumption that the Moa-hunters lived there longest and in greatest numbers.

Burial Customs. The burial practice differed from that of recent Maori culture in several important respects. The favourite attitude, followed in all cases where the bones were those of an adult male, was extended or prone interment. A specific orientation (head to the east or south east and feet to the west or north west) was also consistently followed, and was departed from only with juveniles and females. In place of the complete exhumation and removal of the bones to a safe hiding place so commonly applied by the Maoris to men of rank, the relatives here were satisfied with the occasional removal of the cranium or the complete skull. This open burial adjacent to the village area with all or most of the bones and the grave offerings left intact suggests again that the Moa-hunters were under no necessity to conceal the remains of their dead from hostile intruders.

A typical burial (no. 5) is shown in line figure 2.

The skeleton, presumably that of a male, is prone and lying face downwards. It is complete except for the cranium, but the still articulated mandible indicates that the removal of the cranium was post burial. From the section it will be seen that the upper layer, demarcated by a heavy black line, shows clear evidence of disturbance at points immediately above the body and some four feet beyond the mandible where there is an accumulation of grave offerings. Most significant was the recovery of the units of a necklace of the whale-tooth type in moa bone. These were found ' twined' round the butt of the large adze and the inference is that on opening the grave to remove the cranium the relatives lifted the necklace, still with cord intact, and thrust it into the far corner of the grave. The perforated moa egg is typically placed above the body and was apparently the last offering to be placed with the dead. Having survived the first filling in of the grave, and presumably a second disturbance and refilling, it is not surprising that it was found broken into scores of pieces, not all of which could be recovered.

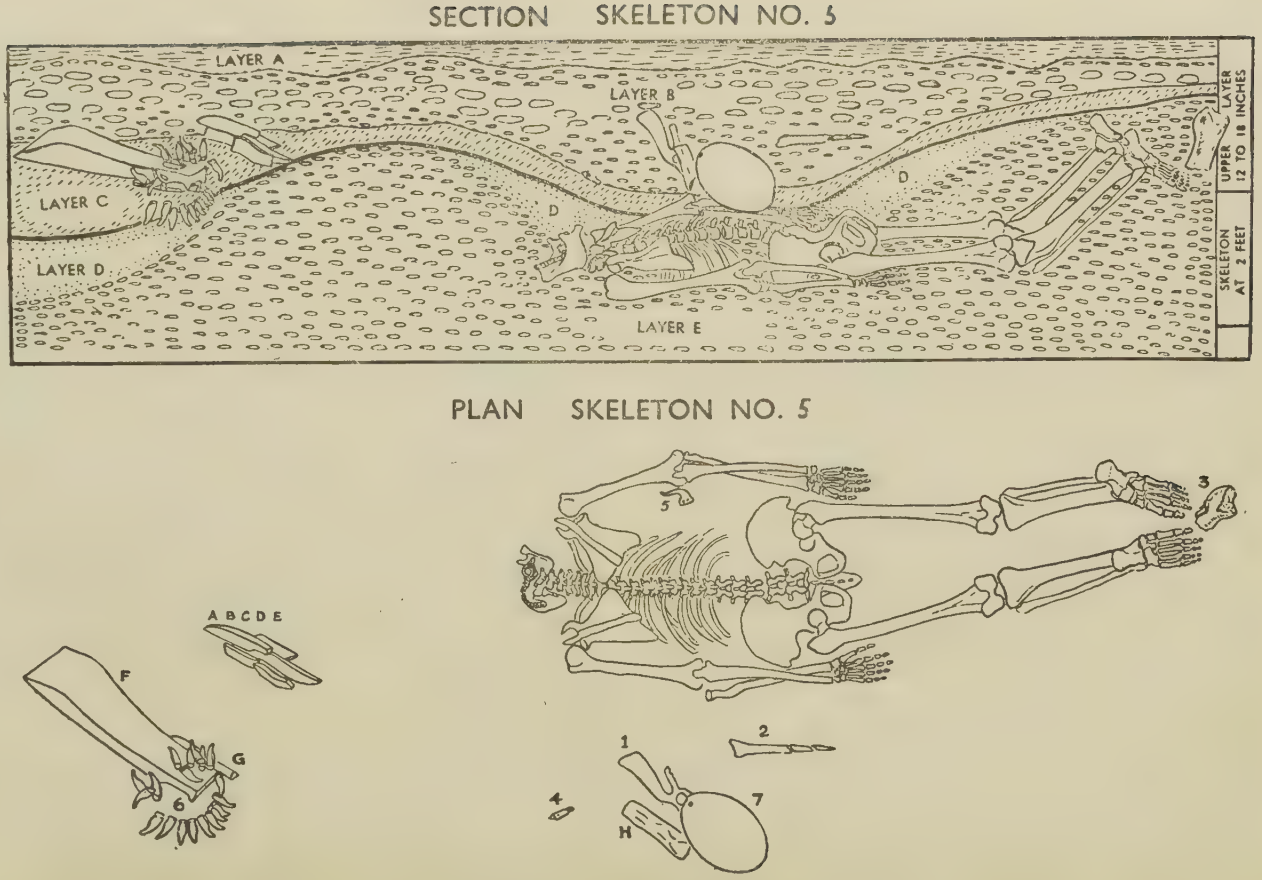


Fig. 2. LINE DRAWING OF TYPICAL BURIAL (No. 5) IN SITU.

PLATE I

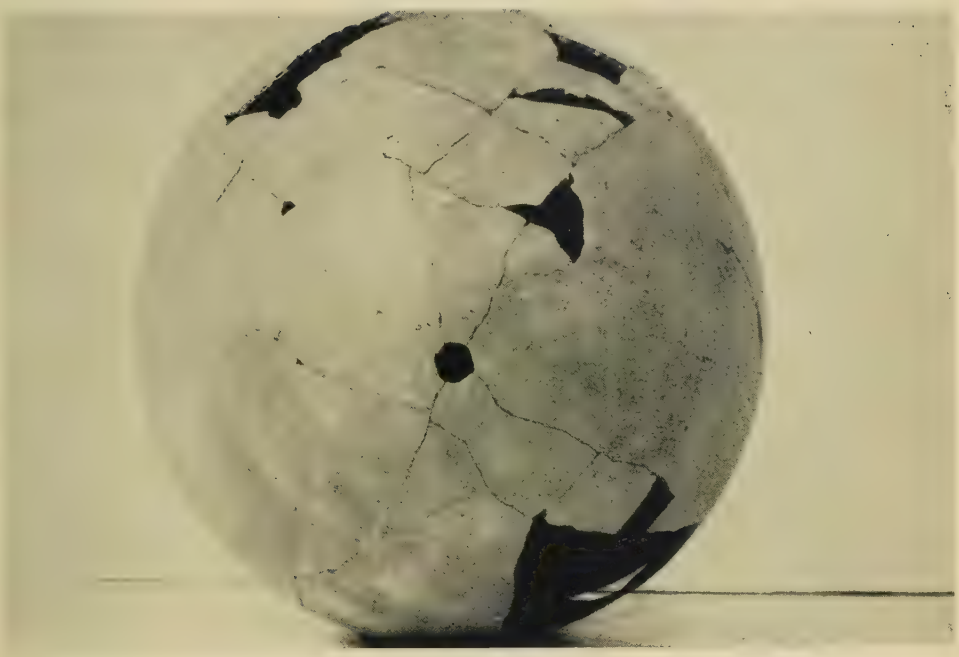
RECONSTRUCTION OF BURIAL No. 2, SHOWING GRAVE OFFERINGS, INCLUDING BLOWN MOA'S EGG.

facing p. 76

PLATE II

NECKLACE OF 21 WHALE-TOOTH UNITS IN WHALE IVORY, BURIAL No. 2

PLATE III



END VIEW OF RECONSTRUCTED MOA'S EGG FROM BURIAL No. 5, SHOWING PERFORATION
Max. width of egg 145 mm.

RECONSTRUCTION OF A MOA

This reconstruction represents DINORNIS, the largest moa, whose extinction is generally accepted as pre-human. The alpine background is not typical of the habitat of the large grazing moas.

Photograph supplied by the High Commissioner for New Zealand

It was however painstakingly restored by Edgar F. Stead of Christchurch, and PLATE III clearly indicates the perforation and, incidentally, the perfect reconstruction of its contours.

The drawing (FIG. 2) also indicates another common occurrence, the presence of deliberately placed moa bones at burial level, here a fibula, the ischial process of a pelvis, and the proximal portion of a femur. Of particular note among the other offerings is the large perfectly finished ground adze (F) of the tanged quadrangular type with twin poll lugs. This handsome adze measures 450 mm. (18 inches) in length, 53 mm. in depth, while the cutting edge measures 136 mm. ($5\frac{3}{8}$ inches). The burial depth, here in unploughed ground, was 24 inches. The section could be divided into an upper layer with subdivisions respectively of surface soil (A), close packed stones (B), discoloured sand (C), varying in depth from 12 inches to 18 inches, and a lower layer of coarse shingle (E) with a shallow stratum of sand (D) adjoining the base line of the upper layer. The bones, egg and other perishable grave finds owed their state of preservation to the slight sand stratum, a circumstance even more marked in Burial 2 (see PLATE I). Here an upper layer of much the same constituents and depth rests on a solid zone of sand. By contrast Burial 29 was represented only by the crumbling skull and the faint remains of the long limb bones, a condition due probably to shallower burial (skull at 12 inches, feet at 17 inches) beneath a permeable matrix of loosely piled stones. It is noteworthy that the solid root portions of the 38 sharks teeth found *in situ* as a necklace had completely disintegrated. The contrast between the burials however more obviously indicates differences in the protective nature of the matrix than differences in age.

Owing to the frequent post-burial removal of the skull, and to the number of cases where the pelvic bones had disintegrated, I list with diffidence my determination of the sex of the burials, as follows ; adult male 16, adult female 3, immature 4, unknown 6.

The few measurable crania were examined in February of last year by Dr H. L. Shapiro of the American Museum of Natural History during the session of the Seventh Pan-Pacific Science Congress. At the risk of anticipating Dr Shapiro's report I record his opinion that their characteristics were strongly Polynesian, with few apparent differences from the Maori norm.

Evidence of inclusion of a moa egg was found in nine out of twenty-nine burials, including every burial of the first group of seven whose other grave offerings indicated that they were men of rank. The only two eggs recovered intact were each perforated from one end, while of the four capable of restoration two were perforated. It is clear that the eggs had been blown when fresh and the purpose of the single perforation was to convert them into water bottles. Assuming that the Moa-hunter occupation was prior to the introduction of the gourd, such receptacles would become valued property and their inclusion in the graves can be ascribed both to this value and to the tapu of their association with persons of rank. The masses of fragments of eggshell found throughout the area give evidence of a reckless use of the eggs, and this would be a major factor in the extermination of the birds. The eggs range in length from 194 to 207 mm., and in greatest breadth from 139 to 145. Falla refers them all to *Euryapteryx gravis*, the most numerous genus surviving in the human era.

Of bones of extinct birds, the moas could mostly be referred to *Euryapteryx**, a short, squat genus, with a few bones assignable to *Emeus huttoni*, a still smaller and less massive type. There was no evidence of the presence of Dinornis (sensu stricto). Bones of the

* Euryapteryx gravis (Owen). Synonyms : Dinornis gravis ; Emeus parkeri ; Emeus boothi ; Emeus haasti ; Euryapteryx kuranui.

extinct swan (*Chenopis sumnerensis*) occurred as regularly as moa bones and in direct association with middens. Bones of the extinct eagle (*Harpagornis moorei*) comprised a claw and several tibia and ulna ends worked into awls. The extinct crow (*Corvus moriorum*) also shared a contemporary presence in the middens.

Of mammalian bones, human bones were found only in burials and in one probable identification as units of a necklace of reel-shaped beads. Seals and whales were most numerous, while the Polynesian dog and the rat were certainly contemporary.

Shellfish comprised existing species.

Hooks and Harpoons. The importance of line-fishing in the Wairau economy was well shown by the numbers of hooks recovered. These were either bait-hooks conforming to the usual Polynesian shape, with inturned unbarbed point, fashioned in one piece from moa bone or the ivory of seal canines. The average size did not exceed two inches, so that we can assume that sharks and larger fish were taken with wooden hooks which have disappeared. The lure-hooks represented an exact copy of the Polynesian bonito lure, with the necessary difference that the shank was shaped in stone. This copy was probably not very effective because of the lack of a suitable substitute for pearl shell, and it was abandoned in post-Fleet times. The points of three small bone and ivory harpoons found agreed exactly with those of the Marquesas and were probably similarly operated (harpoons are unrecorded elsewhere in Polynesia).

The recovery of awls shaped from stout limb-bones of birds and the Polynesian dog, and bone needles occasionally found secreted in the awls, suggests that at this period considerable use was made of seal and bird skins (including those of the moa) in fashioning garments. A single example of the barbed bone bird-spear point, and three serrated blades of tattooing chisels, close the list of miscellaneous bone artifacts.

Personal Ornaments. The significance of the personal ornaments has been foreshadowed, in referring to the burials. They are of interest in reflecting the original patterns brought from Polynesia, before they were supplanted by the new forms evolved in nephrite. By contrast with the recent Maori ornaments which were worn as ear pendants or single breast pendants the most valued Moa-hunter ornaments were worn as necklaces. In one type the units represented smaller conventionalized copies of sperm or killer whale teeth as worn in recent Fiji. The Moa-hunter units were small, between 2 and 3 inches long, and considerably stylized. They were most frequently fashioned of moa bone, and the prevalence of moa-bone would assist the development of the fashion to a degree impossible in tropical Polynesia where it depended on the teeth of stranded whales. Of four necklaces found the number of units ranged from 18 to 23. In one necklace of 21 units, each was fashioned from sperm whale ivory (PLATE II), but ivory units were otherwise exceptional. The closest resemblances from outside New Zealand are found in recent Fiji, while in the single breast ornament of Hawaii the treatment of the lower extremity agrees more closely with the Wairau form. This suggests not so much a direct influence from Western Polynesia as the retention in New Zealand of a form antedating the cultural differentiation of Polynesia into Western and Eastern areas.

The Polynesian affinities of the tubular beads of the second necklace type are again somewhat generalized. Recent Polynesian records are rare and of uncertain provenance, the evidence comprising a few strings of ivory beads, variously ascribed to Fiji-Tonga, the Cook Islands and Hawaii. In New Zealand the fashion was firmly established in moa-bone, then transferred to seal and whale teeth, to the fossil *Dentalium* shell, and to serpentine, limestone and other soft stone. The most impressive beads or reels, were those cut from the mid-femur of *Euryapteryx* ; these measured approx. 2½ inches long by

1½. The rounded mid-shaft needed elaboration only to the extent of filing a transverse median ridge and grinding the ends flat. Necklaces comprising respectively eleven, seven and four moa-bone units were found with the burials. The units were arranged round a central pendant comprising a complete sperm-whale tooth, for which in one instance an elaborate substitute in serpentine stone was provided, approximately 9 inches long, and weighing 1½ lbs. Ivory beads were rarer, and the sole necklace of 7 units was found with Burial 1. Only one example of the serpentine version of the reel was found, fortunately in a grave with moa egg offerings, demonstrating that this substitution originated when moa-bone was still plentiful. Stone reels were widely found in New Zealand before Wairau demonstrated that they were copies of easily made bone and ivory prototypes, and the complete lack of Maori knowledge of their purpose is well revealed in earlier discussion on them. Stone reels are evenly distributed between North and South Islands, although those of bone and ivory predominate in the latter.

Other ornaments comprised drilled porpoise teeth, and necklaces of pierced valves of a bivalve (*Myodora striata*), and 38 shaped teeth of the *Carcharodon* shark. As in the Chathams, the root apices were ground flat, to enable the teeth to ' ride ' better, and the perforations made through the root. Several large curved needles, worked from unidentified rib bone, appear identical with the cloak-pin of Maori and Moriori.

Stone Adzes and Chisels. The most numerous and important finds were the 207 stone adzes recovered (64 from the burials, 143 from the midden area). These not only make it clear that the Moa-hunter Maoris migrated from Eastern*, rather than from Western, Polynesia, but pinpoint the dispersal centre as the Society Islands.

The adze evidence is important enough to warrant a digression.

Eastern Polynesia is distinguished from Western by the presence of adzes with a deliberately provided lashing grip or tang, conforming respectively to a quadrangular (Type 1), reversed triangular (Type 4), and triangular section (Type 3), of which the first two predominate in marginal areas such as Hawaii, Marquesas, Pitcairn and the South Island of New Zealand, and the third in the central groups of the Society, Cook and Austral Islands. Adzes are only tangless when too small to make it easy to reduce a grip, and typically of quadrangular section with the planes of the back, front and sides sharply intersecting (Type 2, A).

The major and puzzling exception to this pattern of distribution has been the north Island of New Zealand. Here tangless adzes predominate (Type 2, B) in examples of every size, while the cross section is rounded quadrangular as in Fiji and Tonga (the ' Walzenbeil ' of Heine-Geldern). The problem has been whether the North Island type represents an early (Melanesian) migration via Fiji and Tonga (a highly plausible route geographically), or an example of the local development which Buck (1944) has shown to be widespread in Polynesia. The Wairau site demonstrated that the Eastern Polynesian types, which are characteristic of the South Island, reached there in the earliest known New Zealand culture period, while among the 207 adzes only 2 corresponded, imperfectly, to the North Island norm (Type 2, B). This supports the hypothesis that Type 2, B represents a local and comparatively late development originating in the North Island, the environmental factor being the widespread presence of older non-basaltic rock unsuitable for the skilful flaking necessary in shaping the Eastern Polynesian

* Eastern Polynesia is the vast area of which New Zealand, Hawaii and Easter Island are the limits. It includes the Kermadecs, the Cook Islands (taking in the Northern Cook Atolls), Society Islands, Australs and Rapa, the Tuamotu Atolls, Pitcairn and Mangareva, and the Marquesas.

proto-types from fine grained basalts and clink-stones. In Fiji the same environmental factor was present, as well as the cultural influence of Melanesia where adze sections are always rounded.

At Wairau the predominant material was a fine grained altered mudstone (baked argillite), a remarkably tractable medium, quarried from a few outcrops peculiar to the northern end of the South Island, in Nelson and Marlborough. The virtual absence of nephrite is striking, in the light of our knowledge that it is peculiar to the South Island, originating mainly at Arahura on the west coast. Presumably the early settlers favoured the eastern grasslands as the main habitat of the moas, and several centuries elapsed before nephrite was discovered and its possibilities realized. Only 2 of 64 grave adzes from Wairau were of nephrite, while the material had not become common enough to give rise to the Hei tiki, ear pendants and other nephrite ornaments characteristic of later Maori culture.

The major Wairau adze types will be briefly listed and described.

TYPE 1 : (TANGED QUADRANGULAR). Variety a.

The cross-section is quadrangular, with all planes intersecting sharply, front somewhat wider than back. The grip is sharply reduced below the level of the blade which meets the butt in a marked shoulder ; longitudinally the grip is somewhat concave, with the outer corners of the poll occasionally eleborated as lugs. The back is often strongly concave longitudinally.

The more common variety (40 examples) agrees closely with the standard Hawaiian type, differing in the evidence of reduction of the grip by bruising, a technique which foreshadows the elaboration into lugs of the outer corners of the poll. These are large adzes, ranging up to 467 mm. (18 $\frac{9}{16}$ inches) in length, and 10 lbs. in weight. Within New Zealand the variety is common in the South Island, rare and localized in the North. Beyond New Zealand it is recorded from : Hawaii, Marquesas, Tuamotu, Pitcairn, Rapa, Rarotonga and Tokelau.

Of the more specialized variety with lugs on poll, only three were found, the largest, from Burial 5, obviously a ceremonial adze of great value. It was perfectly ground on all surfaces except the grip and showed no signs of use ; length 450 mm. (18 inches), width cutting edge 136 mm. (5$\frac{3}{8}$ inches), weight 11 lb. 13 ozs. Within New Zealand this variety is sharply confined to the South Island and the Chathams. Beyond New Zealand it is found in an arc extending south and west from the Society Islands :— Raivavae and Rapa ; Mangaia and Rarotonga ; Nassau and Manihiki ; Uvea.

Plotted on a map the distribution pattern of both varieties of the type shows a very clear diffusion from the Society Islands, and, to judge from the distance travelled from the dispersal point, an early diffusion. With the exceptions of the Tokelaus and Uvea the pattern sharply coincides with the Eastern Polynesian culture area and language family. The evidence from Western Polynesia indeed comprises only two adzes, which may indeed have reached there in post-European times.

Until recently no example of either variety was recorded from the presumed dispersal point, the Society Islands. Having searched in vain in museum collections in Paris, London, New York, Honolulu, Cambridge, Oxford and Edinburgh, I was startled to find last year a perfect specimen of the horned variety in the museum of the Whitby Literary and Philosophical Institute. This agreed so closely with the New Zealand forms that without its well attested origin from Borabora in 1830, I would have assumed it was from New Zealand. This important record suggests that examples of both varieties, although overlaid in the Society Group by the later triangular type, will be readily recovered by excavation and further search in existing collections.

The type is peculiar to the Oceanic area, and until recently was recorded only from Eastern Polynesia where it was considered by Linton (1923), Burrows (1938) and Buck (1944) to be a local development. Remarkably similar types have now been recorded by Beyer (1948) from Luzon in the Philippines, with extensions in Formosa, and on the south Chinese coast at Hoifung.

Beyer ascribes the type to his Philippine Middle Neolithic (2250–1750 B.C.) and derives the Eastern Polynesian tanged adze culture from it, a point of origin and a date which both agree closely with our reconstruction of the early proto-Polynesian migrations from Indonesia.

Type 1, Variety B corresponds with Heine-Geldern's (1932) ' schulterbeil ' a thin quadrangular sectioned blade, tanged by the lateral reductions of the butt to form a ' spade-shouldered ' grip. Only two argillite examples and one in nephrite were found. The type is not important in New Zealand or Polynesia, and the chief interest is in the existence of the type in South-east Asia. Beyer ascribes it to the Philippine Middle Neolithic but notes its rarity, and regards it as originating in Assam or Burma.

TYPE 2 : QUADRANGULAR ADZES WITHOUT TANG. (VARIETY A).

These are essentially smaller examples of Type 1, the grip being neither necessary nor easy to apply, except by the ' spade-shouldered ' method, above. Numerically an important proportion of the total, the 57 found ranged in length from 3 to 6 inches, in weight from 2 to 11 ounces.

TYPE 3 : TANGED TRIANGULAR (APEX DOWNWARDS)

It is significant that the triangular cross section, which in the 18th century was the dominant one in the central groups of Eastern Polynesia, was represented as a minority in Moa-hunter New Zealand. The section of the Wairau examples is so shallow that the grip is produced mainly by the reduction of the sides, while the width of the blade at the shoulder exceeds that of the cutting edge. The only common form, Variety C, totalled 17 examples. Its characteristics are still retained in the most widespread variety of the triangular adze of the Cook Islands, and the chief interest of the New Zealand forms is in establishing the order of diffusion of the types.

TYPE 4 : TANGED, TRIANGULAR (BASE DOWNWARDS)

The outstanding characteristic of Variety A is the triangular cross-section, with the base line the broad base or back of the adze, and the narrow cutting edge terminating the hog-backed ridge of the front or face. The cross section is only triangular towards the grip, and towards the cutting edge is sub-rectangular or trapezoid. There is a well-marked grip, reduced below the face to leave sharply projecting points at the poll and but shoulder. The line of the back is often concave longitudinally.

Examples are of medium size, the largest of 47 found was 252 mm. (10 inches) long, with cutting edge 35 mm. (1⅜ inches), weight 2 lb. 13 ozs.

The shape clearly reflects a specialized purpose although the distribution cannot be explained in terms of that purpose. In New Zealand the distribution correlates with 1 A, being most common in the South Island, present but not common in the Chathams, rare and localized in the North Island. Beyond New Zealand it can be readily traced from the Society Islands, where it is not uncommon, to the Marquesas, Tuamotu, Pitcairn, Cook Islands and Kermadecs, a clear diffusion pattern.

This is a modification of the ' vierkantbeil ' of Heine-Geldern and the ' keeled

trapezoid ' of Beyer, by both assigned to the late or full Neolithic of Indonesia, and dated by the latter between 1750 and 1250 B.C.

Variety C and D represent a number of small gouges or rounded chisels derived in my opinion from a hog-back pattern, although often with rounded section, and typically without a grip. They reflect the great development of wood carving in the Polynesian Neolithic and remind us that the practice of fine carving in New Zealand is as old as the Moa-hunter era.

TYPE 5 : LATERALLY HAFTED ADZE

The final Moa-hunter type represents what I consider the most remarkable specialization in Polynesian Neoliths. Whereas the Polynesian adze was normally placed base downwards on the foot of the haft, with the line of the cutting edge at right angles to the axis of the shaft, this adze developed from a blade placed side downwards on the haft with the line of the cutting edge in the same plane as the axis of the shaft. One side thus became the base and the other (flaked to a ridge-like edge) became the face or front, a reduction at the butt providing a lashing grip. The implement still remains an adze in that the bevel retains its original position as on an adze resting upright on one side.

Of the 36 New Zealand records of this remarkable type, 28 came from the South Island and 8 from the North. Wairau produced three.

Beyond New Zealand the only true equivalent comes from Pitcairn. The Mangarevan ' axe ' is evenly bevelled to a wedge-like edge and is a true axe. In the Society Islands and other groups where it might be expected the need of altering the plane of the blade was met by mounting a normal adze in a wooden sleeve which rotated on the foot of the haft. This type would seem to be a purely Polynesian invention, and not, like the other types listed, an echo of proto-types in South-east Asia.

Conclusions from Adze Evidence

With the type material dated by the facts of excavation the Wairau adzes provide the most important evidence up to now on the origin of the earliest immigrants to New Zealand. They are seen to have arrived from Eastern Polynesia, and in particular from the dispersal centre of the Society Islands, carrying with them adzes whose proto-types are known from the Late Neolithic of Indonesia and Southeast Asia. The extent to which this immigration covered all New Zealand is unsettled, but the presence of the majority of the types in the northern extremity of the North Island, and their prevalence throughout the South suggest that the gap was caused by the local emergence of Maori culture proper in the centre of the North Island and the consequent retreat of the Moa-hunter culture to opposite marginal points. For the emergence of the later culture the chief social stimulus would be the landfall of all later migrations, down to the 1350 Fleet, on the North Island Coast. The environmental stimulus was the new and completely different physical nature of the land.

A Nineteenth Century Moa

In these articles I plead guilty to using the term moa very loosely, in some contexts to group all the widely differing genera of the Dinornithiformes, but more often with specific reference to the medium-sized eastern grasslands genera (notably Euryapteryx gravis) whose wholesale slaughter characterizes the Moa-hunter period of culture as defined here. It is to Euryapteryx that the traditional name moa presumably refers and I follow Falla (1942) in regarding it as unproven that the Moa-hunters' quarry included the gigantic Dinornis in the specific sense.

Since Part II was written strongly circumstantial evidence has been obtained of the 19th century survival of Megalapteryx, the small kiwi-like, forest-dwelling, genus which is technically classified with the Dinornithiformes. The discovery was made west of lake Te Anau in a subalpine valley in the only partly explored southwestern fiordland of the South Island, where a colony of the large flightless rail Notornis Hochstetter (or Takahe) was found surviving in 1948, fifty years after the last record of its existence. While patrolling Takahe valley in October last year Mr K. Miers found limestone shelters with evidence of recent occupation by a Maori fowling party. Investigating the surface dust of the floor in December, Dr R. A. Falla found well-preserved tussock bedding and textiles, including flax nooses and sandals, unfaded feathers of Kakapo, Notornis, Kiwi and ?Megalapteryx, and, belonging to the same occupation, the broken and dismembered skeleton of an individual of Megalapteryx. With Dr H. D. Skinner of Otago museum I agree that several deep cuts on the ischial process of the pelvis were probably chopped with a metal cutting edge, and local history would place the post-metal but pre-settlement period when the Maoris had access to such tools as between 1813 and 1840.

It is significant that the Southland Maoris have no traditional record of this encounter between Megalapteryx and man. While it is possible that this 19th century expedition represented the first penetration into the only survival pocket of Megalapteryx ever disturbed by man and the Maoris killed a bird for which they had no name, it accords equally with the absence of tradition that the Maoris did not recognize Megalapteryx as the moa of tradition and described it as a ' big kiwi ' or ' giant rail '.

The Ngai-Tahu fowling party who ate Megalapteryx do not however qualify as Moa-hunters as this essay defines them. While for the sake of precision the latter might more strictly be called ' Euryapteryx-hunters ' I propose to continue the more euphonious and still useful term Moa-hunter to refer to the demonstrably remote period when the moas survived in the eastern grasslands in large enough numbers to define and determine a well-marked Maori culture period centred on hunting them. For the North Island this period is terminated before the Fleet arrival of A.D. 1350, for the South I allow an overlap until A.D. 1500.

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The Apulia Expedition: An Interim Report

by J. S. P. Bradford

THE first (1949) season of archaeological reconnaissance on the Foggia Plain in South Italy has confirmed, in the most striking manner, the existence of one of the densest concentrations of ancient sites to be identified in Europe in an area of comparable size. For readers of Antiquity, their nature had already been foreshadowed in these pages (1).

These discoveries were first made from British air photographs taken in June 1945, which revealed the plans of settlements, farms, roads and field-systems existing below the surface of the ground or clearly visible to the air camera. They were distributed across 3000 years of Italian history, from the Neolithic to the Middle Ages, and illustrate from the archaeological record three principal stages in the rise of a European peasantry. This is a theme that affords ideal ground for the conjunction of Archaeology and Ethnology; and it is appropriate that the Expedition should be based on the Pitt Rivers Museum at Oxford, which was founded on this very principle.

Now, thanks to the Apulia Committee, set up under the auspices of the Society of Antiquaries and representing the University of Oxford and learned societies, it has been possible to proceed to the second and fundamental stage :—namely, to carry out the first systematic programme of archaeological investigation based on air photographic data ever conducted in Italy. This also included the first British excavations there for a number of years, with the permission and helpful co-operation of the Italian authorities (2), and the support of the British School at Rome.

Our target was a coastal plain some 60 miles long by 30 miles wide, rather larger than Wiltshire and with a soil as rich in sites, but in a large measure unexplored. In 1949 more than 50 new Neolithic, Roman and Medieval sites were measured and examined on the ground, and several were also tested by trial-excavation in a season lasting only 10 weeks, beginning in September. This selection is only a small proportion of the sites revealed by the photographs, but they were distributed over the area from one end to the other. The detailed clarity of their plans on the photographs makes it possible to combine speed with the greatest precision in locating them. Field research of this kind and on this scale is, therefore, a unique departure in Mediterranean archaeology. British archaeology has a fine tradition of taking the lead in developing this special technique, and there is now an unequalled opportunity of bringing this experience to bear on the study of the ancient civilizations at the heart of the Mediterranean world.

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[1] Antiquity, December 1946 and June 1949.

[2] We wish gratefully to acknowledge the valuable help received from His Excellency the Italian Ambassador, and Dr Montanari of the Embassy; from the Director-General of Antiquities and Fine Arts in the Italian Ministry of Public Instruction (Dr G. de Angelis D'Ossat); from the Superintendent of Antiquities for Apulia (Prof. C. Drago) who greatly facilitated the work; from Sig. Argardio Campi and his staff; and from Sig. Fernando Pavoni.

My particular thanks are due to Professor C. F. C. Hawkes, Mr I. D. Margary, Mr T. K. Penniman, and Professor R. E. M. Wheeler (Chairman of the Apulia Committee); and also to my wife for all her help before, during and after the Expedition and in the preparation of the plans.

There are no other regions in Italy in which the natural conditions of terrain and cultivation are so suited for this purpose. To put it into effect, grants were generously made for a preliminary season in 1949 by the Society of Antiquaries, the Trustees of the Leverhulme Fund, the Craven Committee of Oxford University, the Prehistoric Society, the Ashmolean Museum and by a donor who gave invaluable aid when most needed.

But this year, in 1950, a wider appeal has become imperative if the programme is to be carried through in full. Its curtailment would jeopardize the results already obtained, which depend for their full value on being systematically completed. A detailed Appeal for Funds has been issued through the Committee, and contributions which will be welcome, can be sent to the Apulia Committee, c/o the Asst. Secretary, Society of Antiquaries, Burlington House, Piccadilly, London. The work of the second season will complete the reconnaissance phase, and should clear the way for later work on a larger scale at one particular site. But this year's programme is, perhaps, the most vitally important. The survey of new sites of all periods must be continued (many fine ones necessarily remain unvisited as yet), and the test-excavations must be rounded off. Rapid and irrevocable destruction by ' deep ploughing ' machines, which with steel teeth tear up the rocky subsoil by acres at a time, is becoming widespread, and adds a note of urgency. One of the finest examples of a centuriated Roman field-system and road junction was utterly and forever obliterated, thus, shortly before last year's Expedition arrived.

The 1949 season divided itself naturally into two phases :—fieldwork came first and this occupied over 5 weeks, while test excavation followed at a few selected sites. These confirmed, beyond doubt, two fundamental points. (1) It was found that work on the ground confirmed (while naturally adding to) all the general conclusions already arrived at by the direct study of the photographs alone. (2) It was shown that, with the use of Photogrammetric Tables, extreme accuracy was possible in determining and measuring the exact position on the ground of crop-mark sites visible on the air photographs. Those used had often been taken from a height of two miles or more, and the object sought might be a small silted-up ditch, only a few feet wide and non-existent as an earthwork, indicated by a few wisps of vegetation in a dried, prairie-like expanse of stubble or sun-burnt pasture. In every case where excavation was carried out the expected ditches, walls, etc., appeared clearly with the first trench to be dug. Even when, as at Masseria Villana, the land had been recently ploughed and there was not the slightest hint on the surface of the twenty-foot wide Neolithic enclosure-ditch beneath, its position was located in a few minutes by measurements taken from the photographs, which gave its distance from two minor modern boundaries ; and the first trench revealed it. This would be equally true of comparable Roman and Medieval sites. *If* the photographs are taken and used with precision, we can now say that air photograph sites of all the main types are thoroughly reliable for archaeology on Italian soil. The establishment, in Apulia, of this important fact was one more proof that the basic principles of discovery from the air, worked out by O. G. S. Crawford, have a world-wide application under appropriate conditions.

In the late summer, circumstances are very favourable for fieldwork. The land is then clear of crops (which, though welcome from the air, restrict work on foot), and bears instead a rich and tell-tale covering of wild flowering plants, grasses and minor weeds. The results are often remarkable and sometimes dramatic, and as indicative of the plans of ancient sites as the crops earlier in the year. There is no doubt that ' weed-marks ' in Apulia (and, under similar conditions, in other regions and countries) are much more than a bizarre phenomenon. They form a distinct, recognizable, and

(most important of all) very reliable class of archaeological site deserving greater emphasis. Broadly speaking they obey the same ' laws ' as do crop-marks, but the weed-marks take a far greater variety of forms. Above ancient ditches flowering species grew taller, more thickly and often more quickly ; and, thus accelerated, had sometimes flowered, withered and prematurely ' fall'n into the sear, the yellow leaf ' before those not so placed. A score of different varieties of wild plants indicated the presence of ditches and other features beneath them. Very often Neolithic and Roman enclosures stood out as bold lines of colour, which could be faithfully recorded by colour-photography. Thus, during our ' ground-check ' of sites seen on the air-photographs we frequently found Neolithic village ditches brilliantly outlined as broad bands of chrome yellow by flowering *Rugola* (a local name for a plant resembling wild cabbage growing in big clumps up to $3\frac{1}{2}$ feet high). This plant, which is found everywhere on the Tavoliere, has roots up to two feet long that take advantage of the extra depth, and its superior growth thus reveals silted-up ditches of all periods impartially. The details of the Roman landscape were often delineated in flowers, by mauve wild mint, white ' cow parsley ', or yellow-flowering thistles. The importance of these weed-marks has been stressed as they are a major factor in the field-archaeology of the region.

A brief summary of results achieved and waiting to be followed up will at the same time outline the nature of the plans for 1950, approved by the Apulia Committee :—

(i) *Prehistoric.* The air-photographs had revealed the buried plans of over 200 ditch-enclosed villages and smaller ' homesteads ' on, and round the edges of, the Foggia plain, which previously had been a virtual blank on the distribution maps of such sites. With so much to be established the only possible policy had a faintly Elizabethan ring, i.e. to confirm their existence and assess their wealth. In a very real sense, an ancient world lay literally at our feet. After identifying a number of such sites by the cropmarks of their outer ditches and enclosures within, a typical example was chosen for test-excavation in which the plan was particularly clearly shown on the ground by well-marked growths of several species of weed. This site, near the farm of Passo di Corvo (7 miles N.E. of Foggia), was selected in order to establish firmly the Neolithic horizon already suggested for the whole group of large crop-mark villages. Enclosed by double and sometimes triple ditches, it covered an area 800 yards long by 500 yards across, within which are numerous enclosures that seem to fill it fairly completely. The position is only slightly raised above the surrounding plain, and is some distance from any existing stream. Our ' ground-check ' made clear that the Neolithic farmers unerringly made use of every slight eminence when siting their settlements. Most were not positions of defensive strength, but of better drainage, etc.

The original photograph which led to its discovery has been illustrated and described in an earlier article (3). It shewed the lines of the 2-3 village ditches in the foreground and background, and some of the 100 circular enclosures so far visible within ; at that date revealed by crop-marks. We chose a typical enclosure among those at the centre of the photograph (compare PLATE V, A). When thus directed to the spot the line of its ditch was seen to be clearly outlined on the ground in a strong localized growth of a particular weed, which exactly revealed its course, its width (almost to an inch) and its wide entrance gap. Guided by the photographs an immense economy in excavation was possible and the trench-grid immediately revealed the butt-ends of the ditches and all principal features.

The area enclosed measured 60 feet by 50 feet. The surrounding rock-cut ditch

[3] ANTIQUITY, December 1946, plate III ; and see site plan, *ibid*, June 1949, p. 63, fig. E.

was 4–5 feet wide and 8–9 feet deep, having vertical or undercut sides. Where excavated, the ditch had been cut as a continuous whole and not in segments or as a line of pits. Traces of a stone revetment were found along the inner lip, but a careful search revealed no definite structures or post-holes at the entrance or within, in soil or rock, in axial trenches 10 feet wide laid at right angles across the enclosure, supplemented by others. However, large fragments of sun-baked clay with ' wattle ' impressions of thin branches were found in the ditch, and also in that of the small Neolithic enclosure near Masseria Villana (see below), implying the existence of structures nearby. The entrance gap was later increased from 18 to 36 feet by filling-in part of the ditch up to ground level, holding this soil in place with a facing of stone blocks built up in the ditch to form a new butt-end. There was thus preserved, below ground, an unusually good specimen of Neolithic walling. But the function of these enclosures is still obscure. Surface-draining is a possible explanation of their ditches, coupled perhaps with water catchment. We witnessed, here, the effects of autumn rains which turned the sun-baked ground into a quagmire and rapidly filled the ditch with 4 feet of water. Further attention will be directed to the problem this year; and, for comparison, enclosures of this kind in other parts of the village will be examined, in order to determine from the pottery whether the whole community of Passo di Corvo can be assigned to a single phase of the Neolithic. In 1950 the big ditches surrounding the village, each with a formidable weed-mark width of up to 20 feet, must also be sectioned; and, if time permits, the single ditch bounding the outer annexe (larger than the village itself).

The ' pilot ' excavations of 1949 proved of great value in showing the range and prolific scale of the finds to be expected from these massive village-communities. This enclosure at Passo di Corvo yielded almost every typical item of Neolithic equipment (apart from figurines) including small polished and flaked axes, saddle querns (4) and polished stone-rubbers, bone points, and broken sherds fashioned and pierced to form an oval pendant and circular spindle-whorl. Characteristic implements and cores in chert (plus obsidian flakes (5)) included small blade fragments bearing the gloss that comes from use when set to form a sickle. There was no sign of any weapons. The great quantity of animal bones will provide good material for the identification of the species domesticated or eaten. The pottery was copious, with over 4,000 sherds from this test-excavation of 14 days. Its full publication must be deferred until further work is done, but the main elements are clear. The prominent class is that of plain carinated bowls, basins, open dishes and globular vessels with tall rims, beautifully burnished, thin-walled and symmetrical in glossy black and rich brown tints; and also very thin burnished bowls in tones of cream and pale grey. Besides these there are other fine wares fired a warm buff, and painted in broad tomato-red bands (*a fasce larghe*) or alternatively, though rarely, in red and white, or a dark chocolate shade in squares of lattice pattern. All of these maintain a very high standard of craftsmanship. One sherd alone had decoration incised *after* firing. Coarse, heavy, pedestal-bases were popular. Sherds decorated with impressed ornament executed with finger tip, shells, etc., were represented but not very commonly (shells from the sea, 15 miles away, were found in the ditch).

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[4] Also shaped tabular fragments of baked clay with a smooth upper surface, probably used in the preparation of food. These are unusual, but in the south Sudan oval grinding stones of baked clay (used with a wooden roller) are found today among the Nuer, in a region lacking stone (see Evans-Pritchard, *The Nuer*, p. 170, fig. 12).

[5] The volcanic mass of Monte Vultore, in the Apennines to the south west is the usually accepted source.

The decoration of a few was painted on one side and impressed on the other, showing the fusion of two traditions (6) of ornament.

Passo di Corvo ranks as probably the largest known Neolithic site in Europe (7), being over twice the size of Köln Lindenthal and Mayen, and appreciably larger than Windmill Hill, Michelsberg or Lengyel in Hungary. When its ditch-enclosed annexe is included with the main village, its length (1500 yards) surpasses even that of the great Neolithic fortified site at Urmitz on the Rhine. Nor was Passo di Corvo unique ; other Neolithic villages of similar proportions were confirmed in 1949 near Masseria Palmori and Masseria Schifata. Size alone, however, is not all. Communities like these have an intrinsic importance for investigation, because they are the largest units which their society and economy could produce at that time, and consequently are likely to provide the most developed aspects of Neolithic peasant culture. We can see, too, from the pottery, that the Passo di Corvo series was derived from a Balkan source or sources (however peninsularized this became when once established in Italy) and the value for research of the Apulian group is further increased since the Balkan sites are for some time likely to be inaccessible.

The large Neolithic village sites at Coppa Cavone and Masseria Palmori, eight miles W.N.W. of Foggia, produced characteristic sherds from ditch-sections ; and our trial trenches confirmed that the smaller circular ditched enclosure at Masseria Villana, typical of the ' homesteads ' of simple form so numerous on the photographs, were also Neolithic. Thus the characteristics of the ' First Farmers in Italy ' are growing gradually clearer and will, I believe, increasingly command respect as these foundations of Mediterranean civilization emerge. We have the opportunity of adding depth, detail and animation to what for long seemed a shadowy ' still-life ', and our new ' Landscape with Figures ' makes a better perspective background for the understanding of subsequent periods. The end of the Neolithic phase and the fate of the big villages remains obscure, and air-photography has not yet been able to pin down a distinctive type of Bronze Age site in this region.

(ii) *Roman.* We come now to the archaeological evidence for the state of Apulian peasant life in the Roman period, We were able, for the first time, to confirm the existence of many square miles of centuriated Roman field-systems, with their roads, private boundary ditches, and farm-enclosures, complete to the small trenches for vines and tree-pits (for olives, etc.) which had been revealed from the air by weed-marks and crop-marks above the ditches which outline them. In no other part of Italy, so far as is known, does there exist any comparable centuriated Roman landscape which has been safely preserved underground for excavation and direct study. In 1949, its traces were examined first by field-work over wide areas, lying miles apart, and next by test-excavation at one or two points.

Such an investigation of a Roman landscape broke new ground. Many of its features had never before been the subject of excavation, and thus we had to begin by establishing their typical appearance and variations. When armed with the air-photographs their outline on the ground is astonishingly clear, when the eye is thus directed to them. Never before have the details of the Roman farmer's landscape been so completely shown. More than a dozen kinds of wild plants and grasses display them well, so that they can be

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[6] R. B. K. Stevenson's periods I and II ; see *Proceedings of the Prehistoric Society*, 1947, p. 85 *et seq.*

[7] Cp. Hans Lehner, ' Der Festungsbau der jüngeren Steinzeit', *Praehistorische Zeitschrift*, II (1910), 1–23 ; Childe, *The Danube in Prehistory* ; Curwen, ANTIQUITY, IV, 22–54.

traced, measured and excavated. The initial problems were those of confirmation and identification, followed by the more difficult search for dating evidence. Trial excavation in 1949, within the field-system of *Luceria* (established as a Latin colony in 314 B.C.) was successful in obtaining a quantity of Apulian ' derivative-Hellenistic ' black-glazed pottery from farm-enclosures, which were sited along the grid of centuriated roads that methodically partitioned the landscape. Test excavations must be completed at Posta di Colle, near Lucera, where there is a fine row of such farm-enclosures each connected to the road by a short drive. All such features are shown by the special growth of vegetation that reveals the ditches demarcating them. The extent of one group of farm-buildings placed round a courtyard, and the two building periods in its plan, were established in 1949. The pottery, now under review, indicates a period at least as early as the 2nd century B.C. for this block of fields, and further material from this year's work may well provide a closer date. We can probably never come closer than here to the realities of farming under the Republic. Certain features in the lay-out of the centuriation below *Luceria* also point to an early date (8), and it may well prove to be one of the earliest systems known. We are thus enabled gradually to supplement the scanty but tantalizing written record for the Romanization of this region of Italy.

In the southern half of our area, round Orta Nova and Cerignola, the encroachments of the excavations for modern vineyards and olive groves is permanently erasing most of the centuriated field system sited near *Herdonia* (Ordona). Several of the remaining fragments of its grid of crop-mark roads have been destroyed, since the air photographs revealed them, by this deep trenching into the rock which itself follows the Roman practice. Without this synoptic view over square miles of country given by the air photographs, these small isolated areas of crop-marks (on ' islands ' of arable in a ' sea ' of olives and vines) would never be recognized or pieced together into a whole system. As the new modern boundaries above ground naturally pay no attention to those below it, one can see clearly the way in which a whole region once covered by Roman centuriated roads can disappear without trace, and eventually fail to survive even in crop-mark form. Even on the huge expanse of grazing and arable land round Lucera, to which principal attention was given, one could never have obtained a coherent idea of the system there, as a whole, without the air photographs as guides. This is but natural, since the parallel crop-marks of the road grid lie hundreds of yards apart, on level ground without vantage points, and are often interrupted for long stretches by types of cultivation incapable of revealing the necessary marks.

Field-work supplied an answer to one problem which the photographs by themselves did not make evident. On the ground, it became clear that the large blocks of centuriated land (9) at the back of the plain were laid out to cover low plateaux, stopping short at their edge, and the axis of each block was adjusted to the natural orientation of the plateau so as best to fill the available area. The blank areas up to several miles wide between the systems, which were a puzzling feature on the photographs, were (we saw) caused by lower-lying ground which they did not choose to centuriate. The significance of such relatively slight topographical differences can only be appreciated on the ground.

[8] E.g., the incorporation of earlier tracks as boundaries for the systems ; see ANTIQUITY, June 1949, p. 67, fig. 2.

[9] These we hope to be able to equate with the land assigned and centuriated round the towns of *Luceria*, *Aecae*, *Ausculum*, *Canusium*, *Herdonia*, etc., mentioned in the *Libri Regionum* ; cf. Pais, *Storia della Colonizzazione di Roma Antica*, 1923. Pais argued that the ascription of much of this to the Gracchan period was reasonable, although the absence (as was then believed) of surface traces had thrown doubt on all these entries.

The Roman vineyards lay along the centuriated roads, and the narrower private roads which ran off them. The lines of parallel ditches dug for the vines were very clear on the ground in various kinds of vegetation. In one area, 4 miles E.N.E. of Lucera a group of many vineyards (each distinguished by differences in the orientation and spacing of the vine trenches) extended continuously over an area of more than 130 acres. This was exceptional, but one big and compact Roman vineyard near Posta S. Cecilia, $4\frac{1}{2}$ miles S.W. of Foggia, itself covered 44 acres. A more typical vineyard, near Masseria Villana between Lucera and Foggia, measured *c.* 200 by 300 yards, with an area of about 12 acres (though many of course are smaller). The foregoing examples all abutted on centuriated roads, and the vine-trenches were as clear on the ground (as weed-marks, etc.) as from the air, though more difficult to photograph. The excavation of examples on widely separated sites proved that the trenches for the vines were normally dug in continuous lines, being 3 feet deep from the surface (i.e. 2 feet deep in the rock), *c.* $1\frac{1}{2}$ feet wide and straight sided. The surface crop-mark varied between $2\frac{1}{2}$ and 4 feet in width. Trial trenches showed that they were set $8\frac{1}{2}$, $9\frac{1}{2}$, $11\frac{1}{2}$ or 13 feet apart, according to the particular vineyard. At one Roman farm (near Masseria Villana), we excavated rectangular slot-shaped pits $4\frac{1}{2}$ by $1\frac{1}{2}$ feet and $3\frac{1}{2}$ feet deep, sited alongside the ditches flanking the ' drive ' up to the farm from the centuriated road. The effect must have been pleasing. This method corresponds to that more commonly used today for planting vines, in which pits of this size hold a pair of plants. One site, on a centuriated road $4\frac{1}{2}$ miles S.S.E. of Foggia, was revealed in a particularly interesting way. The air photographs showed rows of Roman vine-trenches and tree pits. On the ground these were very clear where they crossed the rough bare surface of a broad medieval drove-way (*tratturo*). There they stood out as miniature banks and mounds, respectively, only 9 to 12 inches high. The roots of the small weeds which flourished above them had bound the surface soil and retained it when elsewhere this had been eroded by wind, rain, etc. Excavation showed that the Roman tree pits, cut well down into the rock (only 1–$1\frac{1}{2}$ feet below the surface), were 4 feet square, $3\frac{1}{2}$ feet deep and flat bottomed (**10**). Modern Foggese farmers, when planting young olive trees, dig pits of standard size into the rock measuring 1 metre cube. In this instance, the spacing of 10–12 feet between the pits would have been too close for olives. However humble, archaeologically, such features of the Roman landscape may seem, these precise facts bear directly upon the staple produce of the Roman farmer and help towards establishing a solid basis for the economic history of the region.

In examining the centuriated roads, which were here excavated for the first time, we concentrated on the system laid out below the *colonia* of *Luceria* (Lucera). This extended for some 5 miles along a low plateau roughly running from east to west. At the upper (western) end rose the town on its hill, the hub of this little landscape. Among sections cut through these roads, a typical example was that near Posta di Colle (**11**), shown on PLATE VI. The road was 15 feet across, with square-cut flanking ditches $3\frac{1}{2}$ feet wide and $4\frac{1}{2}$ feet deep. There was no evidence of metalling, and it is doubtful if this ever existed. We were able to show that the many varieties of vegetation that revealed these ditches were

[10] Near Posta di Colle, $4\frac{1}{2}$ miles east of Lucera, excavation gave the same dimensions for other tree pits of this kind. These appeared on the ground as patches of extra tall wild plants. Lines of them were interspersed between the rows of Roman vine-trenches (as small fruit trees are today) in a neat ' plantation ' along a centuriated road, directly opposite a Roman farm-enclosure.

[11] On the ' pasture ' land on this abandoned airfield there were long continuous stretches of centuriated Roman road, each easily traceable for half a mile on the ground.

a reliable guide to the dimensions. Thus at Masseria Perazzo, nearby, we could calculate a width of 14 feet for the road and $4\frac{1}{2}$ feet for the ditch on each side, here very clearly shown by the extra growth of ' fichi selvaggi ' (a low thorny plant with pulpy red fruit), withered but still distinctive when we visited the site. The *Luceria* system is unusual in that only the east-west lines (*decumani*) of the normal centuriated grid of lines were laid out. A further important point lies in the spacing of the parallel roads. On the south margin of this system the last pair lie *c.* 790 yards apart, and the penultimate pair *c.* 680 yards apart. However, the remainder are regularly spaced at intervals of *c.* 580 yards apart, which is the equivalent of exactly 15 *actus*. Theoretical explanations of this are not obvious but there were probably solid practical reasons, and perhaps the lay-out was adjusted so as best to take up the area to be allotted. These and other departures from the ' blue-print ' models of the Roman surveyors' text-books, with their neat gridded systems, and also from the commonest method of basing the land partition on *centuriae* 776 yards square (20 by 20 *actus*), make the *Luceria* system appear experimental, or early, or both. We must give due weight to the fact that all these new Apulian systems, unlike (12) others (e.g., the examples in the Po Valley (13) which are so often reproduced to illustrate a centuriated Roman landscape), have the supreme advantage archaeologically that there is no living successor to systematize them and continually modify the original features. Until now we have had to be content with rigid skeleton-plans which seemed somewhat devoid of reality. With such systems, embodied in modern roads and boundaries, research could not normally pass beyond the elements of the geometry. It is all the more welcome to find in Apulia the flexibility and individual idiosyncrasies that one expects in a landscape that was once lived in. Some of these we know to have been original features, but it should also be most interesting to have evidence of how the system fared in its last years, by which time some individuals may well have taken strange liberties with it.

(iii) *Medieval.* In the Medieval landscape, the field-systems of the Roman world have disappeared and there are fundamental changes. We have before us, instead, the traces of a feudal landscape constructed round defended villages and castles. This period has, in many respects, produced the most remarkable results of all, for in this same area of Apulia the plans of about 30 large earthworks have been disclosed by the air photographs.

The majority were visited and examined in 1949, and proved to be the sites of abandoned Medieval villages, motte-and-bailey castles, and Imperial ' hunting-seats ' of Frederick II. They also included such important but hitherto unplanned earthworks as those of the deserted Medieval port and town of Salpi, and the Angevin siege-camp against the Saracens in Lucera (probably that of Charles II in 1300), which we have identified for the first time a mile or two outside the town. Many of these sites were altogether unknown, and none of them has been adequately planned or studied on the ground, nor has any pottery been systematically collected from them or excavations made. But with vertical air photographs we have of course the essentials of a site-plan to scale for each one ; and we can also often see on the photographs the network of field-systems surrounding them, enclosed by ditches, and the trackways which approached them. On the ground these latter features could never have been appreciated unless the eye was guided to their traces in this way, but *then* they can be readily recognized, either as slight

[12] The only comparable parallel is the sanded-over centuriation in Southern Tunisia.

[13] See ANTIQUITY, December 1947, ' A Technique for the study of Centuriation ', for air-photographs of these.

earthworks or as crop-marks, etc. We devoted some time to the study and identification of the characteristic appearances of these features of the Medieval landscape and to recording them.

Apulia was a ' key-area ' in the early Middle Ages, but though a certain amount is known about the history of its cities the archaeology of all save a few of the field-sites has made very little headway. In the identification of our sites from written sources there do not appear to be any Apulian chronicles that help us very much. But there are a number of charters (**14**), donations, and other documents from the mid-eleventh century onwards which *do* give some information about certain of our abandoned village sites and for Frederick's ' hunting-castles '. I am especially grateful to Miss E. M. Jamison for her experienced guidance in this subject. A discussion of the documents for the latter will be found in the volumes of Eduard Sthamer and Haseloff, *Die Bauten der Hohenstaufen*, but both chiefly concentrated on the most famous and accessible stone-built castles, and lesser-known sites mentioned in the documents remained very shadowy. But their work has provided an indispensable background of historical fact for our field-researches. We can also form some idea of the state of our region in the 14th century from the list of places returning Papal Tenths and their classification as a *casale* (open village), *castrum*, *arcipretura*, etc. (**15**).

Almost all these earthworks which we examined, measured and photographed were extremely rich in surface finds of pottery. Two main types of outstanding importance were evident. The first of these was a class of un-glazed wares, painted with thin red stripes in simple curves and groups of vertical lines on a hard, thin, well-fired, creamy-white ware. Both the ware and its decoration are distinctive and come from sites with occupation proved by documentary sources to extend as far back as the mid-eleventh century (as at San Lorenzo). It resembles a derivative form of the ' Pingsdorf ' ware that was in use in Normandy, and North, Central, and South-west France in the 11th and 12th centuries ; thus, here we may well have for the first time the pottery of the period of the Norman conquerors and settlers of Apulia (**16**).

The other outstanding group consists of glazed polychrome wares, chiefly large dishes (with foot-ring base), plates and bowls, painted principally in green, yellow, brown and (more rarely) shades of grey and blue outlined in brown on a white ground. The composition of the glaze is a matter for analysis. The colour of the biscuit ranges from cream and light buff, to a dark pinkish-buff. At the centre of these vessels are painted spirited animals, birds, fish and human figures, usually singly, while geometrical and curvilinear patterns are very common. The only sherd with incised *sgraffiato* decoration characteristic of the Eastern Mediterranean comes appropriately from the port of Salpi, at which we also found a sherd of brilliant blue Rakka-type ware. These Apulian discoveries have an undoubted relationship with the Levant, and we have very close parallels with the early 13th century material from the American excavations at Corinth (**17**), and from the Crusaders' Castle at 'Athlīt in Palestine (**18**). There is no

[14] See Caraballese, *Il Comune pugliese durante la Monarchia Normanno-Sveva* and *L'Apulia ed il suo Comune nell'alto medio evo* (vol. 15 and 7, *Documenti e Monografie della Deputazione di Storia Patria per la Puglia*, Laterza, Bari).

[15] See Domenico Vendola, *Studi e Testi*, vol. 84. *Rationes Decimarum Italiae*.

[16] I should like to thank Mr G. C. Dunning and Mr Martyn Jope for advice in this matter.

[17] C. H. Morgan, *Corinth*, vol. XI, *The Byzantine Pottery*. Cambridge, Mass., 1942.

[18] C. N. John, *Quarterly of the Dept. of Antiquities in Palestine*, vol. III, 1934, 137 *seq.*, and vol. V, 31 *seq.* On the other hand, parallels from Cyprus are vaguely general rather than particular ; see du Plat Taylor and Megaw, *Report of the Dept. of Antiquities, Cyprus*, 1937–39 (publ. 1949) ' Cypriot Glazed Medieval Pottery '.

PLATE V

A

B

A. A TYPICAL CIRCULAR NEOLITHIC ENCLOSURE IN A SITE OF 'VILLAGE' TYPE, WITH THE POSITION OF ITS DITCH OUTLINED BY A CHARACTERISTIC EXTRA GROWTH OF GRASSES AND WILD FLOWERING PLANTS.

B. CASTELLACCIO. PART OF THE ARTIFICIAL MOTTE, 30 FEET HIGH, OF THIS NEWLY DISCOVERED MOTTE-AND-BAILEY CASTLE. THE DISTANT FIGURES STAND ON THE RAMPART OF THE BAILEY.

PLATE VI

A

B

A. LOOKING DOWN ONE OF THE CENTURIATED ROMAN ROADS IN THE SYSTEM BELONGING TO *LUCERIA*. THE POSITION OF THE DITCH FORMERLY FLANKING EACH SIDE IS REVEALED BY A BUSHY GROWTH OF FLOWERING 'COW PARSLEY'. ROMAN FARM BUILDINGS, VINEYARDS, ETC., WERE SITED ALL ALONG THE ROAD.

B. A SECTION ACROSS THE SAME ROAD, SHOWING THE FLANKING DITCHES (DURING EXCAVATION) CUT INTO THE ROCK.

doubt that Apulian polychrome wares had taken a firm hold during the first half of the 13th century. In this relationship between the Eastern and Central Mediterranean, Sicily probably played an important part. The links with the Levant which some of the Apulian polychrome ware reveals must be fitted into the stream of events which were at that time moving on a European scale. We have to remember the often recurring connexion between Apulia and Greece and Byzantium in various forms, in archaeology and history. At the period when we believe polychrome ware first appeared in our region of Apulia, the 40 years from 1189–1229 witnessed four Crusades to the East and included the capture of Constantinople in 1204 (19). There was incessant Crusader traffic and corresponding trade between West and East: the climax of large-scale movements of Medieval nobility across Europe, who possessed the powers of patronage that spread art styles. In the provincial towns of the Eastern Mediterranean they must certainly have seen plenty of local versions of Byzantine polychrome wares to admire and to inspire them with new ideas. It is possible that the origins of Apulian polychrome wares slightly antedate the contacts with the Near East developed through Frederick II's 'orientalizing' (20) outlook, but he was probably the first to foster it there on a large scale. We may note here the fairly rapid passage of polychrome wares, with interesting successive modifications, across Europe in the 13th century via Southwest France to England, even reaching the shores of Sweden. The many problems connected with the origins of Italian polychrome pottery have been much debated. Here in Apulia, at last, stratified and datable series can be excavated from contemporary earthworks. We hope that test-excavations this year will provide this evidence for both the early red-painted and the polychrome types.

Field-research on these earthworks, based on the correlation of ground-air observation, has already supplied enough detail for a book. In the absence here of the necessary apparatus of photographs and plans, one cannot do more than outline their significance. For this purpose I have selected outstanding examples of varying character. Of the new motte-and-bailey castles, the most interesting is that near the farm of Castellaccio, about 5 miles North-east of Troia, magnificently poised on the edge of an escarpment at the back of the plain. The great motte thrown up, surrounded by its ditch, is an impressive affair 30 feet in height (see PLATE V, B), standing in a corner of the bailey which is divided into an upper and a lower ward. The site as a whole is oval and is as much as 330 yards long. It has all the character of a 'fighting-castle', quite unlike the residential 'hunting castles' on the plain. Its documentary record is singularly obscure. The whole site is thickly strewn with the un-glazed red-painted wares already discussed and thought to resemble Norman 'Pingsdorf' pottery. This site has been selected for test-excavation to obtain a stratified series to confirm this if possible.

Pottery of the same kind was also found by us inside San Lorenzo (21) in a newly

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[19] Similarities with finds from Byzantium itself are generic though sometimes rather faint. The crude but lively 'white painted ware' illustrated by D. Talbot Rice, *Byzantine Glazed Pottery*, plate XII, assigned to the 13th or 14th centuries, is analogous but simpler; for stratified, and datable, material see Martiny, Stevenson and Brett, *The Great Palace of the Byzantine Emperors*, 1947, but it does not seem to provide the prototypes for the Apulian developments.

[20] That such close links existed ceramically at Lucera can be seen in pottery of this period from the Castle, especially in those jugs with filters inside the neck which also occur at Fostat, the site of earlier Cairo, and these must be a direct import (cp. Arthur Lane, *Early Islamic Pottery*, 1947, plate 36, D, E). They are in Lucera Museum.

[21] For vertical air-photograph showing its plan, see ANTIQUITY, June 1949, plate VI.

excavated vineyard, and we have references to the site fom the mid-eleventh century onwards. The archaeology of this huge and complex earthwork, $3\frac{1}{2}$ miles south of Foggia, must await our full report, but now as an essential preliminary we already have the first accurate plan of its triple enclosures, 800 yards overall, with earth ramparts up to 25 feet high. An interesting feature was the surrounding system of field-drainage canals, essential in this marshy setting, which are referred to in the early medieval documents. Here as on so many of our deserted medieval sites we found sherds of Roman Arretine. Some of our finest polychrome sherds came from within this site, including one showing a full-length robed figure closely paralleled on a bowl from 'Athlīt. This might well be expected from a site that was one of Frederick II's favourite ' hunting-castles ' at which we know that he frequently stayed. But if San Lorenzo is scarcely known, the very existence of the great earthwork at the farm called Petrulla (midway between Foggia and Manfredonia) had been completely forgotten. The site appears to be that of the medieval San Chirico (22) which lay hereabouts, though it is an adjacent farm that actually bears the name today. Its size and defences are impressive. There is a rectangular outer ward *c.* 470 yards long enclosed by an earthen rampart up to 15 feet high, with an inner ward *c.* 290 yards across inserted into one side. The slopes of the rampart of the inner ward produced much very fine 13th century polychrome pottery.

We may take the site today called Torrione del Casone between Foggia and San Severo as an example of the hitherto unidentified Medieval villages (23). Probably it fell on evil days and was abandoned like other sites in this region in the late Middle Ages, when the Kingdom of Naples attempted to monopolize the whole area for sheep-farming, bringing ruinous conditions which prevailed until very recent times. The site is roughly square, measuring 430 yards across, with a strong earth rampart standing 10 feet high. Inside, two axial streets (identified from the air) can be seen as broad ' hollow ways ' coming in from the entrances and crossing at right-angles, with building-mounds along them (one being 30 paces across), The whole is dominated by the remains of a lofty stone tower within a deep circular ditch, at the centre of the site. Polychrome wares of 13th–14th century type are abundant all over the surface, and at one point we found undoubted evidence of a kiln, with glazed ' wasters ' and a large natural pebble experimentally dipped in an opaque greenish-white glaze. This is a fact of importance, for we also found glazed kiln-waste at Salpi, indicating local centres for the manufacture of glazed wares. The excavation of such a kiln might well solve many problems.

Perhaps the most spectacular site, and one of which scarcely anything was previously known, is the Medieval port of Salpi whose detailed plan the air photographs provide. Of the Roman *colonia* here hardly more than the name is known, but documents tell us of an early Medieval village, a *domus* of Frederick II, and a port still sufficiently active for the Venetians (24) to covet its harbour and to seek to obtain this and Barletta when engineering an agreement with the Papacy against Frederick in 1239. Today it is a wild and remote spot, on the edge of a great desolate lagoon converted to salt-pans. A massive earthen rampart, often 25 feet in height, encloses a sub-rectangular area *c.* 340 yards square, with two entrances on the North and two on the South approached by ancient trackways, which were identified from the air and on the ground. Within lies a tall and large isolated motte, and on the side towards the lagoon are two important

[22] It is mentioned in documents of the Norman period and still ranked as an *arcipretura* or *pieve*, liable for Papal Tenths in the early 14th century.

[23] See air photograph in ANTIQUITY, June 1949, plate vb.

[24] Cp. Kantorowicz, *Frederick the Second*, 1930, p. 476.

ditched enclosures set against the rampart. The commanding views in all directions extended as far as Castel del Monte. The interior and the broad ditch were carpeted with medieval sherds so thickly that one could sweep them up with a dustpan and brush! We shall return for further work on this site.

These discoveries have a major importance intrinsically, from their nature and numbers, in the study of each of the three main periods under review. But, when considered collectively as successive episodes, the sum total is very much more than three separate investigations. Apulia lies at the heart of the Mediterranean world, and a thorough study of the organic changes in the cultural landscape of a restricted area in it, with which one can really come to grips closely, is a new and promising method to apply. Only such a factual and objective basis could earn the right to formulate generalizations and to build up a synoptic view. The results of this research should help to clarify the evolutionary perspective behind a conservative and traditionally-minded peasantry, representative of many similar regional groups in Southern Europe. Had we concentrated on one period alone this would have been impossible, and we intend to exploit to the full for the advantage of the Humanities these fruitful gifts of scientific technique. Implicit in all the detailed work that has gone on, and is yet to be done, lies this central idea of the study by archaeological means of a Mediterranean peasantry at three vital stages in its growth. Archaeology is after all more than a collection of specialist studies. By treating our theme thus, we may come a little nearer to the roots of European civilization.

Important New Books and Articles

The inclusion of a book in this list does not preclude its subsequent review

DIE GOLDKANNE VON ST. MAURICE D'AGAUNE, by A. ALFOLDI. 1 colour-plate, 18 plates, 27 pages. *Zeitschr. für Schweizerische Archaeologie und Kunstgeschichte*, Band 10, 1948. [The splendid enamels of this jug are interpreted as having formed part of a sceptre of the Avar Khans, looted by Charlemagne and given to St. Maurice].

GIRALDUS CAMBRENSIS IN TOPOGRAPHIA HIBERNIE, ed. by JOHN J. O'MEARA: text of the first recension. *Proc. R. Irish Academy* LII, C. No. 4, Dublin, 1949. [A trustworthy version of the original Latin text of a valuable source of early Irish history].

RECHERCHES SUR LA CULTE DES RELIQUES ET L'ART CHRÉTIEN ANTIQUE, by ANDRÉ GRABAR. Two vols. 8vo: *I*, *Architecture*, 638 pages, 135 figs. *II*, *Iconographie*, 409 pages, 12 figs.: also Album of 70 plates. Collège de France, Paris, 1946. [Reviewed in *Journal des Savants*, July-Dec. 1948. This important work appears to have been overlooked in this country].

THE DEAD SEA SCROLLS, by G. LANKESTER HARDING. *Palestine Exploration Quarterly*, July-Oct. 1949, 112–16. [Severe criticisms of procedure.]

REPORT ON EXCAVATIONS ON THE CAMBRIDGESHIRE CAR DYKE, 1947, by J. G. D. CLARKE, F.S.A. [The Car Dyke proved by these excavations to be a Roman canal constructed in the 1st cent. A.D., remaining in use 'till towards the close of the 2nd century', but not used 'during the later stages of the Roman occupation'. It was probably made originally to meet a strategical need, i.e. transport corn to the troops in the north].

Notes and News

RHODESIAN CULTIVATION TERRACES

The photographs which we publish here show portions of a vast system of terrace cultivation, and the homesteads of the cultivators, near Inyanga in Southern Rhodesia. By the time that the following remarks appear in print it is probable that excavations will have begun, so that a full account of the remains would be premature. Our object in publishing this note is two-fold: (1) to give readers some general information about a matter of topical interest which may be mentioned in the press; (2) to enlist support for the Inyanga Research Fund, which has been founded under the patronage of the Governor of Southern Rhodesia, who recommends it as 'deserving the strongest support'. We do so too, and would urge those of our readers who wish to help to send their contributions to the secretary of the Fund (Mr Neville Jones), P.O. Box 240, Bulawayo, Southern Rhodesia.

It will be obvious at a glance that the remains consist of thousands of terraces deliberately constructed on the steep slopes of the hills, of roughly circular and oval stone enclosures, and of paths leading between walls to those enclosures (see especially PLATE VII). The terraces are not lynchets—which are formed by the *natural* accumulation of soil on the lower sides of fields—but strips of ground on whose lower side a wall has been built to reduce the steepness of the slope and to hold the soil (PLATE VIII). Only by such measures could the cultivation of such steep slopes be possible. The construction of these terraces must represent an enormous amount of labour, and it is legitimate, even without the evidence of excavation (which alone can be decisive) to conclude that the whole complex must be measured in centuries. But it would be rash to suppose that it must have covered many centuries and still more so that it is very ancient. In fact in a climate of heavy rainfall which is continually eroding the surface any great antiquity is ruled out.

So much may be inferred merely from the evidence here published. The appearance of the enclosures supports these inferences. They resemble those other enclosures which have been proved by excavation to be of medieval or post-medieval date. At Niekerk Dr Randall MacIver excavated similar enclosures, finding hut-platforms and the remains of the wattled walls of which the huts were built 'exactly as the modern Kaffir makes them, viz. of a circle of stakes, strengthened by wattle lashings inside and outside, against which thick clay is plastered, so as generally to hide the wattle-work (1)'. He also found grinding-stones, proving agriculture. His photographs (Plates VI and VII) show lines of terraces exactly like those here published; but he strangely failed to interpret them correctly, regarding them as constructed for defence purposes.

It is natural to connect all these remains with the famous ruins of Zimbabwe The name has been interpreted as meaning 'stone houses', though not all Bantu linguists agree on this point; it is however certain that more than one site bore the name. It seems pretty certain that the famous Zimbabwe was the place called Masapa, the capital of 'Monomotapa' who ruled a large territory in the 16th and 17th centuries and had relations with the Portuguese, whose writers have left contemporary accounts of him.

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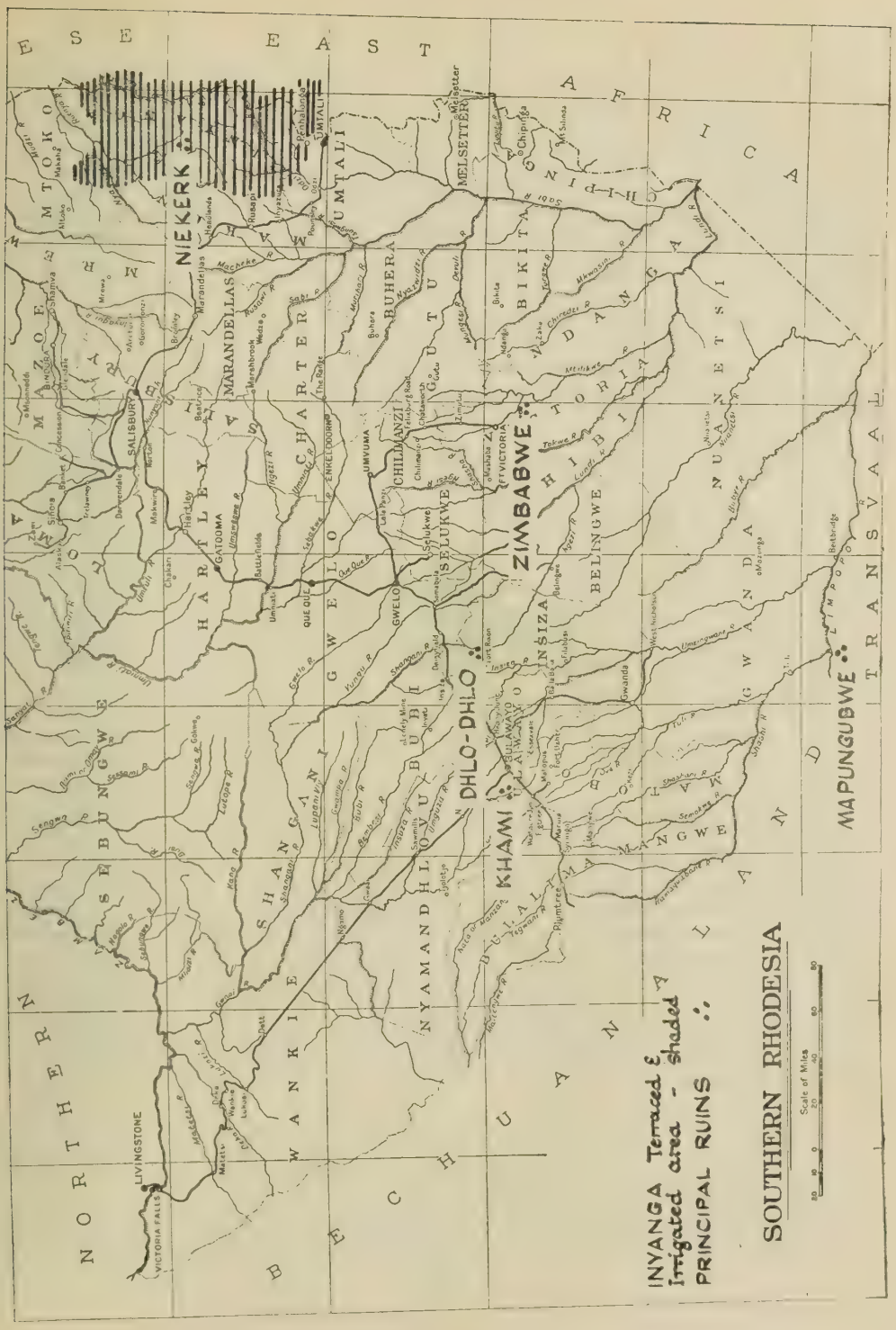
[1] *Medieval Rhodesia*, 27.


SOUTHERN RHODESIA
INYANGA Terraced & Irrigated area - shaded
PRINCIPAL RUINS
Scale of Miles
ZIMBABWE
DHLO-DHLO
KHAMI
MAPUNGUBWE
NIEKERK
MARANDELLAS
HARTLEY
GATOOMA
SALISBURY
CHARTER
BUHERA
UMTALI
MELSETTER
VICTORIA
CHILIMANZI
SELUKWE
QUE QUE
GWELO
WANKIE
NYAMANDHLOVU
SHANGANI
BUBI
INSIZA
BELINGWE
GWANDA
MATOPOS
MANGWE
VICTORIA FALLS
LIVINGSTONE
NORTHERN RHODESIA
BECHUANALAND
TRANSVAAL
SOUTH AFRICA
PORTUGUESE EAST AFRICA

The name seems more likely to be generic—perhaps meaning ' ruler '—than a personal one, but here again the authorities differ. (A mid 17th century missionary describes him as a ' black man '.) ' There is no difference whatever in essential character between the rough buildings that are found in the Inyanga district and those of the Monomotapan capital near Victoria. Zimbabwe reproduces every feature of the modern sites, only with more elaboration and on a larger scale. The " Elliptical Temple " (2) can be completely explained as a combination of the developed form of Inyanga hill-fort with such a stone-fenced kraal as Nanatali ' (3). A little further on Dr MacIver puts these visible ruins in their correct setting, saying : ' It is . . . the huts which constitute the really essential part of the ruin in every case ; the stone wall which the visitor so much admires is only the skin, the huts are the flesh and bone '.

We would warn our readers that the forthcoming excavations will probably be the signal for an outburst in the press of the usual mystery-mongering and the re-hash of stale speculations about King Solomon's mines and similar fantastic rubbish. Excavation has twice over disproved the great antiquity of the Zimbabwe culture, and has shown good reasons for regarding it as ancestral to the recent African culture of the region. The date of the *beginning* of the Zimbabwe culture has not yet been determined ; but it was certainly flourishing at the beginning of the 16th century and may be a few centuries older—it is unlikely to be more. Earlier dating depends upon imported objects such as beads and Chinese pottery(4) whose dating is mainly typological, and for that reason to be accepted with reserve ; and the latest excavator of Zimbabwe has stated her opinion that the earliest stone structures in Southern Rhodesia ' cannot on any available archaeological evidence be placed as earlier than the 10th century and may be any amount later ; and that the latest cannot, on any available archaeological evidence be placed as earlier than the Ming period, 12th century, and may be—and almost certainly are—as late as the 16th century '.

One last point :—Excavators of these ancient sites constantly, and rightly, call attention to features in them which resemble those of the modern local African culture. One such has been mentioned above. But is there any easily accessible publication describing that culture ? Does there exist an accurate plan based on survey of a typical village, a large scale plan, with sections and detailed description of structure, of a typical dwelling, or a detailed, illustrated account of the internal economy of such a community ? The word ' detailed ' is the operative one ; generalities abound, but are useless for comparative purposes. The description of the hut should say, for instance, how its walls are made and whether it stands (as do the ancient ones) on a platform. All these things are of course common and obvious to-day—or were yesterday, when MacIver wrote. They may already be gone ; they will certainly not survive much longer. Here is a piece of work for an anthropologist ; one whose value will increase as the years go by. Further excavators of Rhodesian ruins will not be able to compare them with modern African culture, as recent excavators have done ; they will be entirely dependent upon such descriptions, plans and photographs as may be produced to-day and to-morrow, but not for long after that.

O.G.S.C.

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[2] Which of course is not a temple at all.

[3] *Medieval Rhodesia*, 84.

[4] A Chinese bowl of Ming ware was found at Dhlo-dhlo by Miss Caton Thompson but expert opinion on its date differs by five centuries : see ANTIQUITY III, 1929, 432–3.

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AGE DETERMINATION BY RADIOCARBON CONTENT

A very promising method for determining the age of certain types of archaeological and geological material has been and is under development by Professor W. F. Libby of the Institute of Nuclear Studies of the University of Chicago, Chicago, Illinois, U.S.A. The details of this method, recently summarized by Dr Libby and his Colleagues, Drs E. C. Anderson and R. J. Arnold,* are highly technical and beyond the comprehension of those who are not specialists. In brief, it depends on the fact that all living matter has a uniform radioactivity associated with its carbon content. Assuming this to have been true in times past, and that at death all further supply of radiocarbon (C^{14}) ceases, one may then hope to calculate the time elapsed since death by a count of the residual radioactivity of the isotope Carbon^{14} in the organic specimen. For example, the present assay is 12.5 Carbon 14 explosions per minute per gram of carbon; it is therefore expected that an ancient sample 5700 years old (the half life of Carbon^{14}) would show 6.25. This has proved to be true in a number of samples of known date, which Dr Libby and his associates have already measured, and at present they are engaged in attacking several additional dating problems, in order to obtain further checks on the method through internal consistency comparisons. This work is going steadily forward, and it is understood that since the beginning of 1949, when the paper quoted above was written, a great deal of progress has been made.†

A Committee has been created by the American Anthropological Association and the Geological Society of America to collaborate with Dr Libby and his associates, to develop ideas concerning general policy, and to clarify the procedure and the objectives of the programme. This Committee felt, however, that it was not in a position to secure the

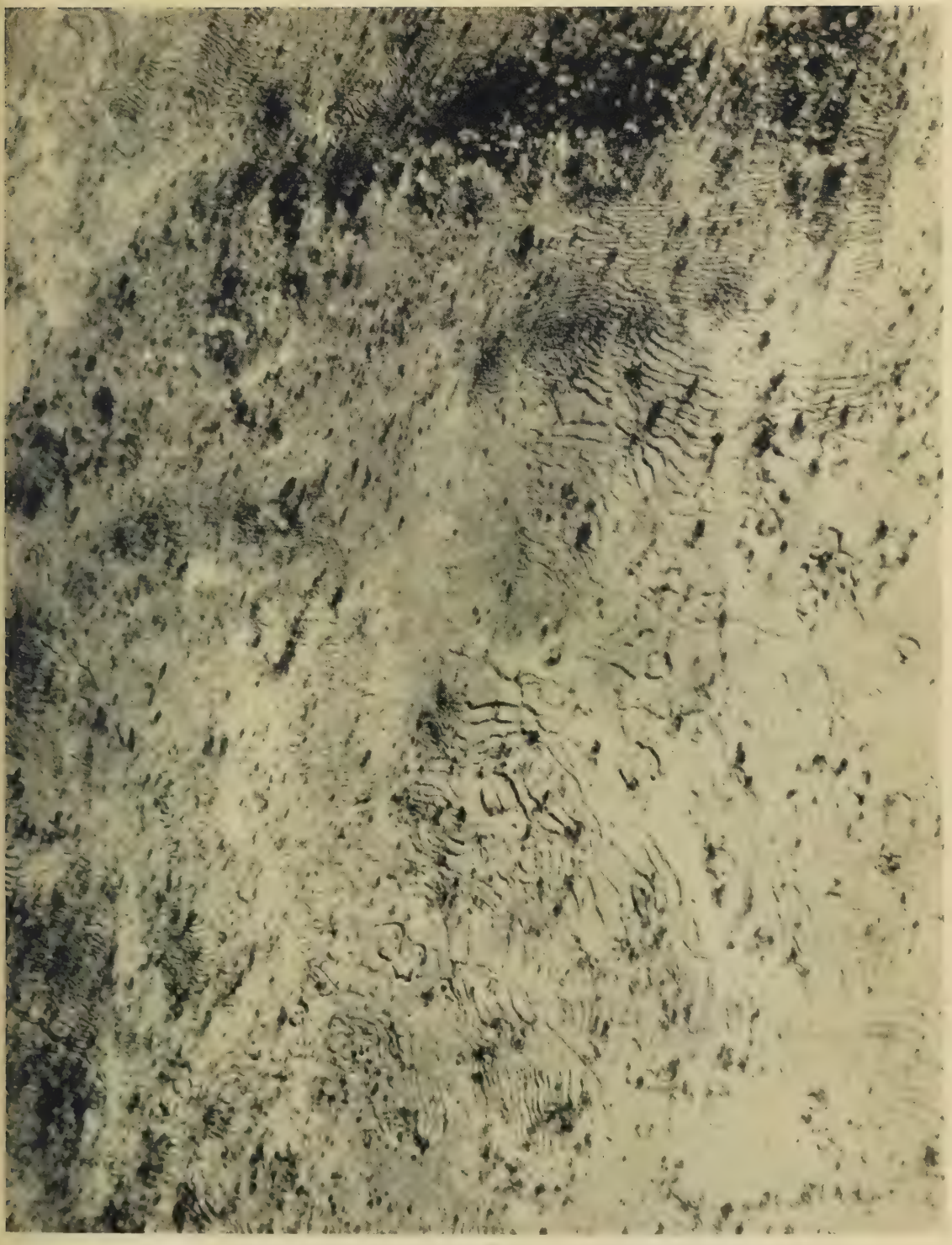
* See *Science*, vol. 109, no. 2827 (March, 1949), pp. 227–8; also 'Editorial Notes' in ANTIQUITY, vol. 23, no. 91 (September, 1949), pp. 113–14.

† Compare paper by Drs Arnold and Libby on 'Age Determinations by Radiocarbon Content: Checks with Samples of Known Age' (*Science*, vol. 110, no. 2869 [December 1949], pp. 678-80); also summary of Dr Libby's recent lecture in London, by I. W. Cornwall, *Archaeological News-Letter* [April 1950], pp. 177-8).

desired samples, and for this reason a number of archaeologists and geologists were requested to join the programme as Collaborators. To represent the Old World, the Committee accordingly has appointed Dr R. J. Braidwood of the Oriental Institute, University of Chicago, as Collaborator for the Near and Middle Eastern areas, and the writer as Collaborator on Upper Palaeolithic, Mesolithic, Neolithic, and later periods in Europe, Asia, and Africa, exclusive of the Near and Middle East. Pertinent material for Dr Libby and his associates, therefore, should be sent to me at the Peabody Museum of Harvard University, Cambridge 38, Massachusetts, U.S.A., since, in order to develop this method of dating, it is necessary to obtain as many completely documented samples as possible from known archaeological and geological horizons. The samples which are desired should come from localities, the estimated age of which is more than 2,000 years and less than 25,000 years. In each case these samples should be large enough to allow several determinations of age on each, in order to permit checking the method, reducing the error, and thereby perfecting the process. Before submitting material to the writer, however, from Upper Palaeolithic and later horizons in the Old World, exclusive of the Near and Middle East, close attention should be paid to the following critical points :

1. Since Dr Libby and his associates, as well as the Committee, are interested in all parts of the world, it is anticipated there will be such great quantities of specimens submitted that it will be necessary to assess priorities. Therefore, a letter should be sent with each sample(s), clearly covering the following details :
   (*a*) The specimen should contribute toward the solution of a real chronological problem. Since at the moment the method cannot be more accurate than ± 200 years, it is obviously not applicable to the solution of detailed historical problems. Its application is pertinent to prehistoric, protohistoric, and the earliest historic ranges only.
   (*b*) The specimen should have a very positive archaeological or geological context or association, so that the date obtained from it will have significance.
   (*c*) The specimen should *not* have been treated or preserved with a chemical solution. If it has been, and it is definitely known what chemicals were used, the specialists may be able to reclaim the specimen.
   (*d*) If there were any peculiar circumstances concerning the stratum in which the specimen was found, this should be carefully explained in the letter.
2. The materials which constitute acceptable specimens (*all specimens are destroyed in the process of analysis and cannot be returned under any circumstances*), in the requisite amounts, are as follows :
   (*a*) 65 grams of charcoal, *but* 200 grams of all other types of vegetable remains—wood, peat, grain, straw, grass or reeds, matting, basket or cloth fragments, etc. Although it is anticipated that a method will be developed for treating ash from hearths and charcoal bits from any darkened floor debris, none has yet been determined.
   (*b*) 200 grams of epidermal animal remains—skin, hide, hair, nails, claws, or horn—but of antler it is necessary to have 500 grams.
   (*c*) 2.2 kilos (5 pounds) of teeth, ivory, or charred bone.
   (*d*) 700 grams (1½ pounds) of shell.

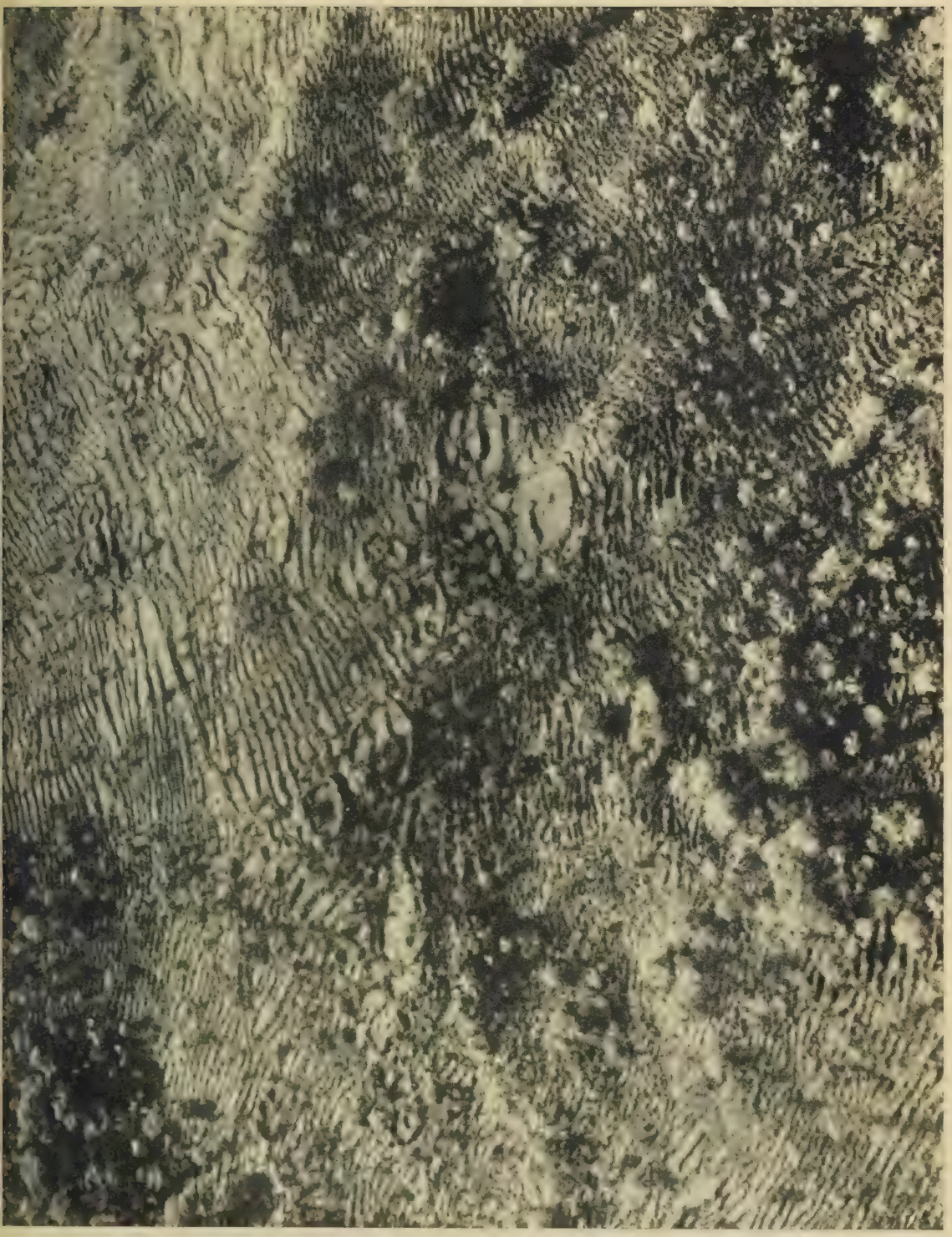
   The quantities noted here assume that the specimen is reasonably dry and free from excess dirt. In cases where only lesser amounts are available from strata which have great chronological importance, Dr Libby and his associates may even be able to obtain results with less than half the above amounts, but a sufficient quantity for more than one counting is desirable. It is also advantageous for checking purposes



CULTIVATION TERRACES AND STONE KRAALS, CONNECTED BY WALLED TRACKS, INYANGA, S. RHODESIA
Copyright air-photograph by R. A. Bourlay

facing p. 100

GROUND-VIEW OF CULTIVATION-TERRACES NEAR INYANGA, S. RHODESIA
Note remains of rough stone buildings on top of low hill in foreground.
Copyright photograph by E. T. Brown, Umtali



CULTIVATION TERRACES AND STONE KRAALS, INYANGA, S. RHODESIA
Copyright air-photograph by R. A. Bourlay

PIGSTY IN NUBA MOUNTAINS, SUDAN

if specimens in more than one of the categories of materials are available. It should be noted that *unburned bone* is *not* listed, since it does not seem promising.

3. Specimens should be separately labeled and wrapped ; i.e. placed in a strong corked bottle, or wrapped in tin-foil or tissue paper, or some other easily separable wrapping—*not* simply enveloped in straw, excelsior, or wood-shavings—and carefully packed in a wooden or tin box for reshipment. In order to facilitate clearance through the U.S. Customs and Postal authorities, all packages should be inscribed ' Scientific Specimen : No Commercial Value '.

It is realized that specimens may not be available at the moment. In such cases, this announcement will serve as a guide in collecting samples in the future. It is hoped that no potential specimens will be lost, and that workers who may chance to visit old sites will watch carefully for pieces of charcoal or other organic materials, which can be obtained from *known* levels exposed on the walls of the trenches of old excavations.

The writer will try to have those specimens which are submitted to him processed, if they fit into the general programme suggested above, as soon as possible after their arrival, and to report to the sender as soon as Dr Libby and his associates have released the results of their test. He also agrees to treat the contents of this report as confidential. In this connexion, it should be borne in mind that considerable control over the announcement of dates is being exercised by Dr Libby and his associates, the Committee, and the various Collaborators. Since these are the initial results of an as yet incompletely known method, it is felt that the premature announcement of a single date, or an incomplete series of dates, without adequate comment, will only lead to misunderstandings, speculations concerning their significance, and conclusions which may prove to be quite untenable. For this reason, Dr Libby and his associates are the sole judges regarding when dates are ready for release. At the proper time they will inform the Collaborators of their results, and a report will be prepared on that particular project shortly after this. Institutions and individuals supplying samples for analysis will be informed of the results on their samples as soon as the report is in an advanced stage, and when the significance of the dates is clear.

In short, the radiocarbon programme is still in its infancy. Nevertheless, it gives such definite promise of striking at the shackles of imprecise chronology in the fields of pre- and proto-historic archaeology, and Late Glacial, as well as Early Post-Glacial, geology that it is certainly deserving of all the support and cooperation which workers in these fields in the Old World can give it. HALLAM L. MOVIUS, JR.

THE PIGSTY HOUSE IN THE NUBA MOUNTAINS

Encouraged by Professor Stuart Piggott's plea for present-day examples of primitive houses made at last year's Prehistoric Society conference on prehistoric houses and farms, I send two photographs of a typical Moro homestead in the Nuba Mountains, Anglo-Egyptian Sudan. There the pig is housed in a permanent stone construction, consisting of low stone ' rooms ' with rectangular entrances and flat roofs, surrounding a roughly circular open space in which he can take exercise and enjoy the sunlight, without fear of escape. His master lives with his family in four or five circular mudhuts with round doorways and thatched roofs, which are built around the pig-run on the stone substructure in which the pigs live. In a climate such as that of the Nuba mountains where torrential rain falls during the rainy season, if a homestead is deserted, the human habitation disappears in a few years, leaving the stone pigsty containing a few sherds and other relics of human occupation from above to puzzle the archaeologist of the future as to how the pigsty can have housed a race of pigmies. A. J. ARKELL.

A NEW TECHNIQUE FOR REMOVING BONES FROM LIMESTONE BRECCIA

Osseous remains embedded in breccia are not uncommonly found during archaeological excavations practised in limestone regions, specifically in areas surrounding the Mediterranean. Such remains, some of them human, were discovered in large numbers during the Palaeolithic excavations of the Boston College—Fordham University Expedition at Ksar 'Akil, near Beirut, the Republic of Lebanon (1). The breccia was found close to the wall of the rock shelter ; at other sites, the removal of less compact materials by various agencies has given rise to the phenomenon known as ' hanging breccia (2) '. The thickness of the breccia at Ksar 'Akil averaged some fifty or so centimetres from front to back. In rock shelters, unfortunately, it is formed in the most protected portion of the deposits, hence in the area which was most desirable for human habitation and now most fruitful in artifacts and bones. Because of the nature of this substance, one recoils from using the primitive methods hitherto employed in working it, i.e., removing it in chunks with drills and then breaking it up with hammers and chisels. Even when a human skeleton has been removed in a block and transported to much more comfortable working quarters in a laboratory, the amount of mechanical work needed to free the bones is appalling.

The breccia of which I speak is composed of soil, limestone chips, flint tools and bones. The soil is derived from disintegrated limestone, and therefore contains considerable amounts of iron compounds and lesser quantities of those of manganese. The agents which cement the miscellaneous components of breccia into a secondary rock are predominantly calcium carbonate (from the limestone) and, to a very small degree, phosphates (presumably from the bones).

The bones occurring in such a breccia are marked by two difficult characteristics (apart from their perverse tendency to break in the wrong direction) : they are more fragile than the surrounding matrix, and they contain more calcium carbonate than ordinary bone. The importance of this fact will appear in a moment. The bones do not provide planes of cleavage, except on rare occasions, hence percussion is a risky process. In addition, it often happens that a rather delicate bone has been crushed, fragments of the bone being intermingled with the matrix in such a manner that purely mechanical treatment would be a matter of seemingly endless patience and time.

Being desirious of extricating some human remains from such a breccia with the minimum amount of damage to the specimens and with the expenditure of a minimum amount of time, the writer set himself the problem of developing a chemical method of freeing the bones from the matrix (3). The report on the results of my investigations falls into four categories : (1) The use of acid ; (2) methods of hardening delicate bone ; (3) the protection of exposed bone ; (4) the optimum conditions for the employment of the method devised.

(1) It would seem that the main constitutent of bone, after the organic matter and the calcium carbonate have been removed, is α tricalcium phosphate. The same may be said for the dentine and cement of the teeth ; the enamel, however, is approximately 60 per cent carbonate apatite and 30 per cent α tricalcium phosphate, the remainder being calcium carbonate and other mineral and organic matters (4). However that

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[1] Ewing, 1947 ; 1949.

[2] Garrod, 1937, p. 123.

[3] I must express my deep gratitude for assistance during the early stages of this research to Professor Douglas Hennessy, of the Department of Chemistry, Fordham University, N.Y.

[4] Dallemagne, 1946, *a* and *b*.

may be, it was clear, even before analysis, that the particular bones with which I wished to experiment contained far more than the normally small amount of calcium carbonate, because of their saturation by lime-bearing water from the country limestone for thousands of years. It therefore behoved me to proceed with caution in applying any acids.

It has, of course, long been known that acids will attack bone ; the microscopists have used phosphoric, hydrochloric, acetic, lactic and other acids for decalcifying bone (5). The use of acid against stone possesses a very respectable antiquity, as witness the chemical experiment of Hannibal while crossing the Alps (6). Acids have also been used in various ways by palaeontological preparators in isolating fossilized specimens (7).

A large number of acids (8) were applied to specimens of animal bone taken from several layers at Ksar 'Akil, and the conclusion was finally reached that weak acetic acid, partially buffered with sodium hydroxide, gave the best results. The amounts found most favourable were :

Glacial acetic acid	.. ..	60 cc., dissolved in
Water	.. ..	1 litre ; to this
Saturated Sodium Hydroxide solution	..	10 cc. is added.

Other conditions besides the kind and concentration of acids were varied. The effect of the cold solutions was compared with that of solutions heated over a steam bath. The use of heat is not recommended. Several wetting agents (9) were tried, but are evidently not worth the trouble, in terms of weight of matrix lost during a definite time.

The formula finally settled upon is effective, but it has its limitations. Its action upon the matrix is slow, and hence large masses of breccia would have to remain in the solution for a long time ; on the other hand, it was found that unprotected bone should not be allowed to be exposed to the acid for more than three or four hours, lest the bone too be attacked and eroded. This is especially true of exposed cancellous parts of the bone ; the outer table resists erosion for a longer time.

(2) Therefore I was led to consider the possibilities of hardening the bone and thus protecting it from the action of the acid. Very often, as in the case of the walls of the maxillary sinuses or of cancellous tissue, the bone needs to be hardened before it can be handled at all. Various experiments were made with substances which might be expected to harden the bone during the acid treatment (10), but no such substance was found satisfactory. The best means of hardening bone known to me is impregnation with

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[5] Gatenby, 1937, pp. 250–1 ; 430–1.

[6] Livy, Bk. xxi, 37.

[7] Camp, 1937, pp. 38–9.

[8] I will mention reagents which proved less adapted to the problem, as thus I may save other investigators time and energy. Particularly to be avoided are phosphoric acid, the action of which soon slows down to a stop and the products of which seem to prevent any other acid from working well ; and citric acid, which in any concentration attacks the bone vigorously. Dallemagne and Mélon (1946*b*) used citric acid to remove the free calcium carbonate from bone ; the notable and destructive action of this acid on my specimens was a good indication of the presence of excess calcium carbonate.

[9] Especially Cetab and Rodalon.

[10] e.g., various phosphates, sodium hexametaphosphate, etc.

Alvar (11). This will, indeed, temporarily retard the etching action of the acid, but it does not offer permanent protection to the bone. After cleaning and thorough drying (air drying is preferable as against drying in an oven), Alvar should by all means be used (12).

(3) It became evident that the intelligent thing to do would be so to protect any exposed bone that one might safely use not only the weak acid solution for long periods in order to reduce the matrix, but also high concentrations of acid, which would accelerate the process. When one approximated the bone, one could then resort to the more delicate action of the formula given.

It was found that exposed bone, painted with a chlorinated rubber varnish (13), was adequately protected against even strong hydrochloric acid. Consequently, I was able to direct the flow of small amounts of hydrochloric acid with a pipette on a thick clump or coat of matrix, until quite close to the bone, with perfect safety. As successive areas of the bone become exposed, new paintings with the varnish were applied. It is imperative that two coats of the varnish be applied to the bone, and that the minimum of two days of drying be allowed for each coat. It need hardly be mentioned that one should first experiment with valueless fragments of bone and breccia, before using the method on a desirable specimen. For instance, one must learn to judge when the matrix has become so porous that it might allow the strong acid to reach the under-lying bone in particular spots. It is also quite understandable that the composition of breccias from different areas might vary.

(4) We have, then, a method for removing the calcareous matrix from bones in breccia, a method which calls for a minimum of percussion. This advantage is a great one when the bones are brittle, as they usually are. Some time is saved, as other work can be done while the weak acid solution is working on the specimen.

The use of the weak acid solution is particularly advantageous when the bone in question has been approximated either by mechanical means or by the use of strong acid and protecting varnish. The final cleaning need not be done with needles, but can be safely left to the formula. As a matter of fact, when the bone is covered with encasing matrix up to, say, two to three centimetres in thickness, the weak acid solution will render the matrix quite porous, and thus much more amenable to mechanical treatment. The use of the formula is also especially recommended in the case of crushed bones

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[11] Manufactured by Shawinigan Products Co., Shawinigan Falls, P.Q., Canada, and Empire State Bldg., New York, U.S.A. A thinner solution of Alvar is better for impregnating the bone; a thicker one for gluing. In any case, the bone must be absolutely dry before Alvar is applied. Cf. T. P. G. Shaw, 'The Properties of Some of the Polyvinyl Resins as Lacquer Resins', Pamphlet reprinted from the *Official Digest of the Federation of Paint and Varnish Production Clubs*, January, 1937, New York. I am greatly indebted to Mr Frederick P. Orchard, Assistant Curator of Archaeology, Peabody Museum, Harvard University, for advice regarding the use of Alvar and for many other kindnesses.

[12] Angel, 1943. On pp. 4–5, Angel describes a method of complete impregnation with Alvar; a method which involves the use of an aspirator, thereby to ensure the removal of air from the bone and satisfactory substitution of the Alvar.

[13] The varnish used was 'Tornesite', which was kindly provided for my experiments by the Perry-Austen Mfg. Co., Grasmere, Staten Island 5, New York, U.S.A. This varnish proved to be excellent; and I wish here to express my gratefulness to the Company, and my appreciation of their product. The Company supplies a thinner, and so solutions of varying density can be employed, as in the case of Alvar. I used a thinner varnish for the first coat, a thicker one for the second.

whose splinters are commingled with matrix, and in the case of two pieces of a bone which was broken before consolidation of the matrix, the pieces now being united by a thin line of stone, difficult of access by tools. J. FRANKLIN EWING, S.J.

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PIGEON-TOWERS OF THE FAIYUM

After reading James Hornell's excellent article (1) it seemed desirable to call attention to the pigeon-towers of the Faiyum which lies about fifty miles west of Cairo.

As physical anthropologist to the University of California African Expedition encamped from September 1947–February 1948, at Kom Oshim, near the eastern entrance to the Faiyum, I had an opportunity to visit several of the pigeon-towers (*Burg el-Hammam*). The best examples seen were at Jalal Ibrahim Beni Uthman (PLATE XI) near Sennoures and along the shore beyond the Auberge du Lac beside Lake Karun. The former is a five-tiered building with its solitary low entrance in the centre. Inside as soon as our eyes became light-accustomed, we could see the gallant array of circular pigeon nests extending in rows to the highest part of the towers. There were three inner double banks of nesting-boxes and with the six towers, each open to the infinitely blue sky, there was room for about 6,000 pigeons to nest simultaneously.

The owner showed great pride of ownership and muttered that they were really not any financial drawback for they ate off his friends and neighbours. As he said this his sons could not refrain a smile. Our guide, Tolbah from Kom Oshim, assured us that all pigeon-towers in the Faiyum were extremely profitable.

The pigeon-towers of the Iranian Plateau, such as those at Isfahan and Shahreza (cf. my ' Contributions to the Anthropology of Iran', Pls. 132–3, Chicago, 1939), are far more complex structures ornamented with stucco stalactite decorations.

Some buildings at Dzhanbas-Kala in Soviet Turkistan exhibit this same type of architectural construction based originally on pigeon nesting-boxes. Although non-functional, the motif is repeated to give an unusual effect.

HENRY FIELD.

[1] James Hornell, ' Egyptian and Medieval Pigeon-houses ', ANTIQUITY, no. 84, pp. 182–85 and pl. II, December, 1947.

Reviews

PRIMITIVE POTTERY, an Introduction to South African Ceramics, Prehistoric and Protohistoric. *By* J. F. SCHOFIELD. *The South African Archaeological Society Handbook Series, no.* 3; *pp.* 220 *with summary and index,* 14 *plates,* 7 *text figures and end-paper map. Published by the Society at Claremont, Cape, South Africa. Price, to non-members,* 17*s* 6*d* (*cloth*) *and* 15*s* (*paper*).

The South African Archaeological Society is to be complimented on inviting Mr Schofield to write this book and on publishing it when written. Its subject matter is one with which European archaeologists are in general little acquainted, but, should they desire to become better informed, they will find Mr Schofield a trustworthy guide. His book opens with a prologue on the origin of pottery followed by an account of pottery-making among primitive people; and although there may be little factually new in these opening pages they contain so many refreshingly sound observations that they inspire complete confidence in whatever the author may write in his later chapters.

Pottery is a late arrival on the South African archaeological scene and it is classified in this book under five heads: (1) Pottery from Later Stone Age sites; (2) Bushman pottery; (3) Hottentot pottery; (4) Pottery from Iron Age sites; (5) Recent pottery.

The Later Stone Age sites are either open sites or caves, but the pottery from the former may be attributed either to a post-Stone Age occupation or to accidental intrusion. Several cave sites are described, and the curious fact emerges that the pottery found in decorated caves and shelters is broken into comminuted fragments, while that from undecorated caves consists of larger sherds. In both cases the available evidence indicates that the pottery was not made by the cave-dwellers themselves.

There is very little Bushman pottery and its sole distinguishing feature is the use of grass as a filler. It seems that, in his struggle for existence during the 19th century, the Bushman abandoned the art of pottery-making and readily adopted the pottery of other people.

Hottentot pottery is comparatively scarce and little known, chiefly because the nomadic existence led by a Hottentot tribe did not lend itself to the accumulation of masses of debris. Much of it is thin and well-burnt and is characterized by the frequent use of a pointed base and perforated lugs, often internally reinforced. The larger pots were sometimes made elliptical in horizontal section, and in general the pottery forms were such as to be adapted for transport by pack-oxen. Mr Schofield considers that pottery-making among the Hottentots did not antedate the European occupation of South Africa by any lengthy period, and he suggests that the interval between *c.* 1470 and 1770 would allow ample time for the deposits in which it is known to occur.

The section devoted to the discussion of Iron Age pottery is the largest in the book and is prefaced by an ethnological introduction. The term 'Iron Age' has, of course, a very different connotation in South Africa from that which it has in Europe, and the pottery described in this section ranges in date from the 11th to the 17th centuries A.D. It has been classified according to districts—Rhodesia, Bechuanaland, Transvaal and Natal—and the pottery from Rhodesia includes that from such well-known (and comparatively late) sites as Zimbabwe and Mapungubwe.

To quote from Mr Schofield's admirable summary :

' The earliest Iron Age pottery (that of the proto-Sotho peoples of Southern Rhodesia), called R_1, has in its typical forms a carinated profile and was frequently decorated with a comb—features still found in the wares of their descendants. The carinated profile is also characteristic of the Tonga tribes of the Zambesi Valley and the Ronga of Portuguese East Africa. This indicates that the feature has a remarkable antiquity and must have originated before their separation, and perhaps while their tribal ancestors and those of the Sotho were still one people '.

Now it is a fact not without interest that a similar carinated profile is a dominant feature in the pottery from certain sites in the Sudan, amongst them Abu Geili, on the Blue Nile, excavated in 1914 by Mr O. G. S. Crawford on behalf of the late Sir Henry Wellcome.* This pottery may be dated roughly from the 1st to the 8th centuries A.D. or even later, and may possibly be ancestral to that described by Mr Schofield. He mentions elsewhere in his book that the Hottentots encountered by the early European explorers owned a breed of cattle similar to those depicted on Ancient Egyptian monuments, and this may be taken as evidence of influence from the north at some time in the distant past.

The modern pottery of South Africa is discussed under the names of the tribes who make it. Here again there are occasional resemblances between some of the pots illustrated and some modern Sudanese pots, though these similarities may be accidental rather than significant. Mr Schofield himself gives a warning against a too facile interpretation of similarities of this kind when he observes (p. 22) ' the polychrome pottery made at Dhlo-Dhlo and Khami during the 18th century might be mistaken for Hallstatt wares of the 9th century B.C. were its provenance not well established. The present-day pottery made at the Rustenberg Location on the traditional lines of the Pedi has all the distinguishing features of La Tène pottery '. Such resemblances, however, are in a different category from those between contemporary pottery made in different parts of Africa.

If only to show that he has read the book and not merely Mr Schofield's own summary of it, the conscientious reviewer must note occasional misprints due to hasty proof-reading, but these are small blemishes on what must for long remain the standard and authoritative work on South African ceramics. F. ADDISON.

THE GILGAMESH EPIC AND OLD TESTAMENT PARALLELS. *By* ALEXANDER HEIDEL. *University of Chicago Press*, 1946. 20*s*.

This is a companion volume to the same author's *Babylonian Genesis*, treating in a similar way the other of the two earliest known and most celebrated Babylonian epics. It falls into two clear halves, the first containing translations (Ch. I) of the Gilgamesh Epic and (Ch. II) of certain other cuneiform texts related in subject to various parts of that Epic : the second half (Chs. III and IV) compares the leading motives of the Epic with the ideas manifested in the Old Testament upon the same subjects. These leading motives are defined by the author as ' Death and the Afterlife ' and ' The Story of the Flood '. They are, of course, upon a quite different footing, for whereas the Epic as a whole is a meditation upon ultimate death, the Flood is only an incident in the drama of mortality. Dr Heidel's translations, both of the Epic itself and of the illustrative texts,

* Now in course of publication. See also *People without a history* by O. G. S. Crawford, *Antiquity*, XXII, no. 85, March 1948.

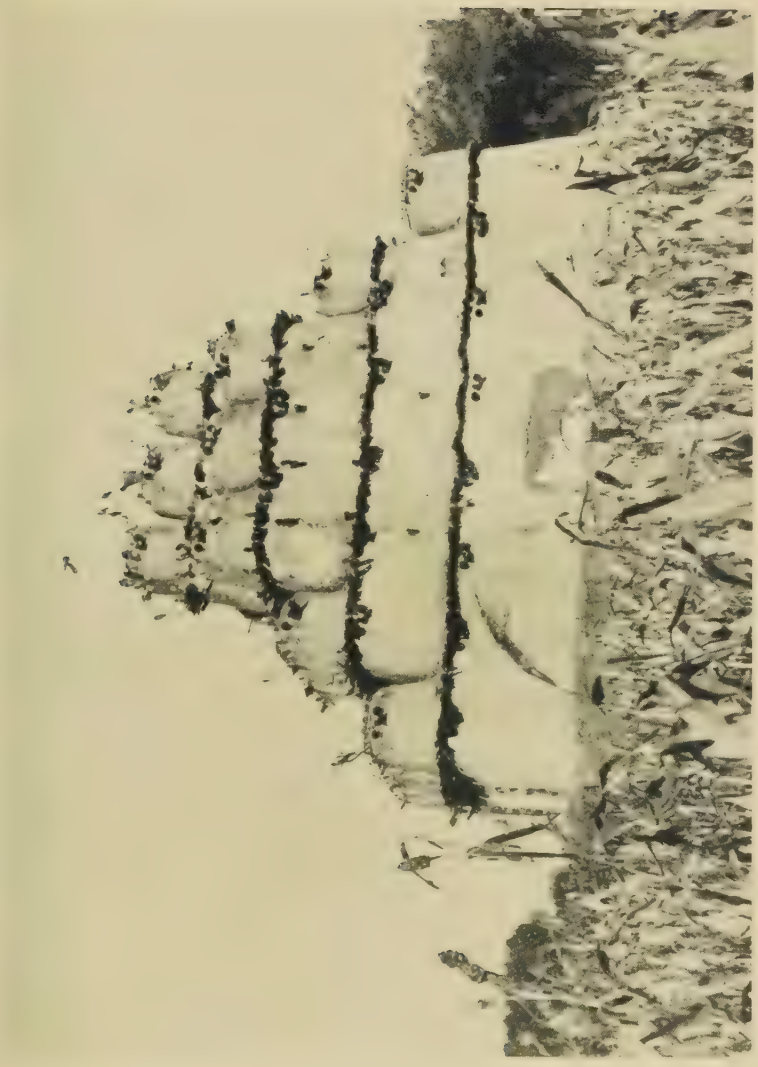
are welcome as up-to-date and, in a few cases, the first English renderings of the originals ; as for their quality, they rely upon the best authorities, and no doubt a very careful perusal would reveal that they have benefited in detail from the resources of the Chicago lexicographical collection. In one respect they do not give as much as some preceding versions, for no attempt is made to introduce the Sumerian Gilgamesh, a figure of considerably different appearance, projected in a diffuse light, to which the Akkadians gave concentration and focus, though rather spoiling their own effect by admitting an old but inconsequential episode as their Twelfth Tablet. The author might plead for his omission that it is too early to discern the true form of the Sumerian Gilgamesh stories, which are still in process of recovery. But there are isolated passages already known which cannot without loss be neglected in the discussions which occupy the second part of the book.

These discussions are not wholly satisfactory, despite their fulness and care, and this is for other reasons besides their choice of only two subjects, having very unequal importance. Even without the vast extension given to this theme by Jensen (whose work Dr Heidel barely mentions), other parallels have been proposed which might deserve some notice. Surely also the various deposits found by excavators in Iraq and put forward as evidence of a flood, or even *the* flood, are equally deserving of discussion with the burial-customs, and they are evidently of great relevance to the question of geographical origin. Yet even when describing the geophysical theories of Suess the author finds no room for these other concrete if disputable remains. A different criticism might be, that Dr Heidel seems throughout too much bent upon emphasizing at all costs the contrasts between Babylonian and Hebrew ideas and practices. To achieve this contrast he tends to harden both sides into an artificial unity of conceptions, and to stress unduly the monotheistic, enlightened, and moral traits of the Hebrew religion to the neglect alike of the plain traces remaining of beliefs in Israel not always consonant with these, and of the (admittedly less developed) elements of a higher character in the Babylonian. This tendency appropriately reaches its height at the end of the book where, after allowing that ' the Babylonian and Hebrew versions are genetically related ' and that ' the skeleton is the same in both cases ', all the rest of the space is devoted to insisting upon their differences, which, in any view, are so obviously less important than their agreements. Economy has dictated the appearance of this book in reproduction from typescript, but it might have permitted an index. C.J.G.

BRITONS, ROMANS AND SAXONS ROUND SALISBURY AND IN CRANBORNE CHASE. *By* C. F. C. Hawkes : *Archaeological Journal, vol.* CIV, *pp.* 27–81. (Also sold separately by the Institute, Lancaster House, St. James's, S.W.1. *Price* 6*s*).

In the spate of books that is now again pouring out of publishers' presses there is a risk that the still, small voice of true scholarship may be drowned. By scholarship I do not mean unreadable discussions of ancient texts but that much broader, more humane form which it has assumed since the scholar put on a thick pair of boots and learnt the art of extracting history from the soil of England. Symptomatic of this new trend in scholarship was the recent creation of a professorship of European Archaeology at Oxford and the appointment of a field-archaeologist to hold it. Professor Christopher Hawkes graduated in the hard but pleasant school of dirt-archaeology which has grown up in Britain during the last three decades : and his latest publication is a triumphant

PLATE XI



PIGEON-TOWER IN THE FAIYUM

facing p. 108

vindication of the founder of that school, General Pitt-Rivers. That great man brought military precision and method to what, in the 90's, was the playground of *dilettanti*. He excavated prehistoric settlements on his vast property of Cranborne Chase, and published the results (at his own expense) in four classic volumes. So well did he do his work that it is now possible, thanks to his meticulate system of record, to go over the ground again and, in the light of half-a-century's progress in knowledge, to re-assess the results. This Professor Hawkes has done in an admirably lucid monograph. He shows how the General learnt as he went along and, unlike so many Victorians, frankly recorded his previous shortcomings. For instance, the plans of huts were recovered by noting the post-holes still visible in the chalk soil; but the General did not discover this technique until after his excavations had been begun and one ' village ' (Woodcuts) excavated. At the second site (Rotherley) all post-holes were recorded; and by analysing the finds, chiefly pottery, in the light of our *present* knowledge thereof, Professor Hawkes shows that there were several stages in its development. Thus the chaotic and complicated original plan is reduced to an orderly sequence. No greater tribute could be paid to the soundness of the General's method.

The most important result of Professor Hawkes's re-assessment is his demonstration that these native settlements of Rotherley and Woodcuts were not in fact villages but rather farms. It is in fact becoming evident that throughout the British pre-Roman Iron Age farms, not villages, were the typical form of agricultural settlement. We began to suspect this when Professor Bersu revealed the oldest English farm at Little Woodbury near Salisbury, where was a large round hut and some smaller ones enclosed within a single earthen rampart. Then it dawned on us that many of our single-ramparted ' camps ' must also be just single farms round which, to meet some external threat, a protecting bank and ditch had been constructed. Thus they fell into line with the traditional *einzelhofer* of other Celtic lands. Just such a farm, we may be sure, was Lidbury near Enford on Salisbury Plain which, from the air, can still be seen standing in the midst of its plainly visible ancient fields—and there are dozens of others.

Thus it looks as if, in Wessex at any rate, the countryside was covered with fields and farms, the former gradually encroaching on the sheep and cattle ranches whose long lines of boundary-ditch are still to be seen traversing the Plain. These ranch-boundaries have been proved by excavation to be even older, dating from the Late Bronze Age; to which, as Professor Hawkes showed some years ago, the division between Hampshire and Wiltshire probably goes back.

The General's last excavation was that of a Roman building at Iwerne, but he died before he could publish his account of it. Fortunately, however, a model was made by Mr St. George Gray, his chief assistant, who has collaborated with Professor Hawkes in producing an account of it. The outstanding facts are that the stone buildings—there were two, both falling within the Roman period—appear to be the ancestors of the famous Long Houses which still survive in our Far West; and that they in turn superseded an earlier timber structure of pre-Roman date.

Space does not permit more than the briefest mention of the General's excavation of Bokerley Dyke, which Professor Hawkes shows to have been constructed in three stages, all falling within the 3rd century A.D.; and of his disentanglement of the adjacent settlement of Woodyates. It is all of the same first-rate quality as the rest.

O.G.S.C.

THE LOST PROVINCE OR THE WORTH OF BRITAIN. *By* M. P. CHARLESWORTH. Gregynog Lectures, 1948. *Cardiff: University of Wales Press*, 1949. 8*s* 6*d*.

The author of this little book has drunk deep at the Pierian spring whose water intoxicates only if taken in shallow draughts. Descending again to earth (at Cardiff) he unfolds his tale in language learnt in the hard school of practice. Each of the four chapters has a clearly stated objective—why did the Romans ever trouble to conquer Britain and having done so remain here, and what did we and they gain therefrom ? In answering these questions all sources of evidence are skilfully used—archaeological, philological and literary ; and it is this blend that gives flavour to the result. Technical terms (such as *foederati*) are tactfully explained. The author has historical insight : he rightly points out the implications of *magni* (or in this instance rather *Maximi*) *nominis umbra*—that the bearer ' must have done something considerable and striking, something which made an enduring emotional impression on the minds of Britons, to be enshrined as he is in legend and tradition '. (p. 29). Maxen Wledig must have earned this heroic fame as surely as did Arthur, Ambrosius, Alfred and others. One suspects that Lord Mountbatten may one day be remembered in India for performing not wholly incomparable tasks.

We admit to a certain hesitation in accepting the author's conclusions about some of the alleged benefits of Roman rule. Loan-words from Latin we certainly have, but so have the Irish (as he shows), and it is not apparent what their benefit is, unless the things they denote were also introduced by the Romans, and many were not. The survival of some Roman words is certain, but its frequency and importance have been over-estimated. The introduction of trees, fruits, vegetables and flowers was possible without conquest (as the German evidence shows). Box was not one of them, being indigenous. Christianity had to be reintroduced from Rome by Augustine. The art of Rome became extinct in England, being superseded by that of the Anglo-Saxons, which has nothing Roman about it ; certain Mediterranean, but not Roman, art-motives came in again with Christianity. (This of course is controversial in certain matters of detail, but surely true in a broad sense). Writing too seems to have become extinct and been reintroduced, but it may have survived in an attenuated form in the Highland Zone. There were watermills in Roman Britain and they must have been introduced by the Romans because there were certainly none here before ; but did they survive or were they reintroduced ? We would not, however, press these points too far ; Mr Charlesworth presents his case, a strong one when all has been said, with force and eloquence.

It seems to us that, in order to prove lasting benefits, a comparison should be made between Britain (or France) on the one side and countries unconquered by Rome on the other, such as Ireland, northern Scotland, Scandinavia and Germany. Such a comparison might suggest that the alleged benefits of Roman conquest were illusory.

We recommend this book most warmly to the readers of ANTIQUITY. It achieves at greater length what it is the aim of every article in ANTIQUITY to do, namely, to present historical and archaeological facts in a popular but authoritative form. O.G.S.C.

ENGLISH POTTERY FIGURES, 1660–1860. *By* REGINALD G. HAGGAR. John Tiranti. *Price* 6*s. net.*

Messrs Tiranti are to be congratulated on a companion volume to their *English Porcelain Figures* by William Ruscoe, for after all the pottery figure is fully eighty years earlier, and to a certain extent set a fashion, which the British porcelain makers were not slow to follow, until eventually the porcelain figures took the lead, and with a few

exceptions the pottery figures became a dim reflection of the porcelain aristocrats of Chelsea, Bow and Derby.

But how the pottery figures differ from one another! They spring upon us in hard white stoneware, perfectly modelled about 1670 from John Dwight's Fulham kilns, and die out about 1840 in those very Victorian figures of Robin Hood, or in those pairs of grave dogs which still adorn the cottage mantelpiece. Between these two dates lie the Stoneware period, 1700–80, the Earthenware period (the so-called 'Astbury-Whieldon' group), 1700–50, the Wood of Burslem period, 1740–1840, and lastly, miscellaneous ' image toys ' early 19th century.

Mr Haggar devotes his first four plates to Dwight's Fulham figures, which are in reality individual sculptures in stoneware, and not commercial productions. The following eight plates deal with the very attractive ' Pew Groups ' and include several from the late Dr Glaisher's collection, and the well-known lady forming a bell, from the Wallace Elliot collection of about 1740. Slightly earlier is an ' Agate ' ware cat, salt glazed, from the same source. Two notable figures in Turkish costume, also in salt glazed stoneware decorated in brilliant green, blue and yellow enamel colours, possibly by William Littler of Longton Hall, bring the series to 1750. It is interesting to note that these same figures were made in hard paste porcelain at Meissen, and in soft paste at Bow.

Turning to the ' Earthenware period,' Mr Haggar deals first with the Astbury-Whieldon figures, nearly all made in Staffordshire. The body was never of Stoneware, but always of earthenware, of a porous character, which required a coating of glaze ; in which both Astbury and Whieldon excelled. Theirs was the heyday of the pottery image maker. The figures are either in coloured clays skilfully blended, or enriched with blotched glazes of purple, brown or green. Plate 15, of a Buffalo, in the Schreiber collection, is an admirable example, and obviously copied from a Chinese model, and its date is about 1750. Two pages further on the author introduces a Deer, likewise in the Chinese taste, about ten years later, by that other outstanding figure modeller, Ralph Wood, the Father of Toby Jugs, one of which may be seen in plate 18. Toby jugs are not strictly pottery figures, but should be dealt with in a volume by themselves. Again the Jasper figures of Josiah Wedgwood hardly seem at home with the products of the peasant potter. For example the Wedgwood ' Ceres ' is coldly lifeless beside the Ralph Wood ' Chaucer ' (plates 22 and 23) which faces it. Plate 27 is another Toby, a standing version, for which Mr Haggar makes no attribution. In the British Museum there is a similar jug signed ' Walton.' The end of the 18th century saw a spate of cottage figures, mostly classical, a faraway echo of Josiah Wedgwood, which degenerated sadly as time went on. They were decorated in enamel colours, and the best came from the kilns of Neale and Co. (plates 28, 29).

It is curious that Enoch Wood's ' John Wesley ' has not found a place in the collection, for it is a finely modelled piece, but the author makes amends with the artist's (for Enoch Wood was a trained artist) ' St. Paul.' The 19th century ushers in John Walton, with his well-known ' bocage,' which has been described as ' the art of the pastry-cook '. He began work at Burslem in 1790 and his factory closed in 1840 (plates 35, 36). With the coming of the Great Exhibition these minor products of the potter faded out, and were replaced by the very conventional figures such as that of ' Orlando ' (plate 40). Yet these by-paths of the potter made in the ordinary way of trade, by men far removed from any artistic centre, have a certain charm, which at the same time gives an insight into the peasant life of the 18th and 19th centuries.

FRANK STEVENS.

died a few weeks back
Proof corrected by O.G.S.C.

THE BOOK OF SAINTS : a Biographical Dictionary compiled by the Benedictine Monks of St. Augustine's Abbey. *Ramsgate. Fourth Edition. pp.* xviii+708. 8¼ *by* 5½. *London : Adams and Charles Black,* 1947. 25*s.*

This is a revised and expanded edition of the book, which first appeared in 1921 and was largely the work of Abbot Dom Thomas Bergh, O.S.B., a scholar, whose conservative outlook explains ' his unwillingness to discard ancient legends, especially if sanctioned by liturgical use '. Each entry has been checked and rewritten and the new editors have usually indicated those cases in which the data are uncertain or unreliable.

The arrangement is alphabetical, entries under the same name being given in the order of the respective feast days in the calendar. For each Saint the following particulars, when applicable, are given : name, surname or distinctive appellation, rank (saint or blessed), liturgical group (e.g. martyr, confessor), religious order, present state of cult (see below), date of feast, year or period of death, brief biography. The result is concise, clear and authoritative.

The formal process of canonization is now centralized by a series of enactments and the Roman Martyrology provides an official list of those proposed for the veneration of the church. There are also individuals, such as the Blessed Alcuin of York who have long received a popular cult, but whose ' veneration has never been accompanied by any recognized external sign of cult '. The status of these two classes is not in doubt and the data on which the entries are based are seldom in dispute. But there is, in addition, a very large number of Saints, whose cult is approved, by which the authors ' mean that there is positive historical evidence of a saint having been venerated as such, even if, as in many instances among the Cornish and Welsh saints, that evidence rests solely on ancient church dedications and there is no other official recognition by the Church, such as an approved liturgical office '. This category includes such widely recognized individuals as St. David and St. Teilo. It will be generally recognized that the data on which these entries rest vary very considerably in value. The present work is not based on original research but claims to incorporate the results of recent hagiographical studies. As far as Celtic Saints are concerned, the claim appears to be justified, though we feel that a few further entries might have been purged or pruned with advantage. The spelling of Celtic names is also confusing, forms like Gallgo and Sadwen figuring beside Gluvias and Daniel (for Deiniol of Bangor), generally, but not always, with cross references. A bibliography at the end of each entry facilitates reference to fuller information.

We have noted the following omissions or corrections. The bibliography has no reference to the late Canon Doble's lives of Cornish and Welsh Saints. Aedan—Aidan Bishop of Ferns : the two discrepant entries refer to the same saint. Garmon—Harmon : Nennius provides good evidence of the existence of a Welsh saint, the patron of St. Harmon's, Radnorshire. St. Gwynhoedl, the patron of Llangwnadl, Caernarvonshire, should be included : his memorial was found in the neighbouring parish of Llannor. Malo : Aleth and St. Malo are distinct places, the former probably the old Roman city and diocese, the latter a Celtic hermitage on the Island of St. Aaron (q.v.). Nectan : the Gotha MS. provides a medieval life as trustworthy as many others used. Regulus : the connexion with the translation of St. Andrew's relics is legendary, but this does not discredit the existence of the saint. Sadwen-Sadwrn : his name appears as Saturninus on his memorial in the church of Llansadwrn, Anglesey. Tathai : the principal saint of this name is the patron of Caerwent, Monmouthshire. Teilo : Llandeilo Fawr, Carmarthenshire, the older centre of the saint's cult is not the same as Llandaff, the later seat of the medieval diocese. C.A.R.R.